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MAINTENANCE INTERVALS

Operation and Maintenance
Manual Excerpt

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Operation and Maintenance Manual

Challenger 65E, Challenger 75E, Challenger 85E and Challenger 95E Agricultural Tractors

6GS1-Up (Machine)
6HS1-Up (Machine)
6JS1-Up (Machine)
6KS1-Up (Machine)

i01476347

Maintenance Interval Schedule

SMCS Code: 7000

Note: All safety information, warnings, and instructions must be read and understood before you perform any operation or any maintenance procedure.

Before each consecutive interval is performed, all of the maintenance requirements from the previous interval must also be performed.

When Required

Air Conditioner Drain Line - Clean 157
Battery - Recycle 160
Cab Air Filter - Clean/Replace 161
Drawbar Wearplates, Swing Stops - Replace 174
Engine Air Filter Primary Element - Clean 175
Engine Air Filter Secondary Element - Replace .. 178
Engine Compartment Hood - Raise/Lower 179
Ether Starting Aid Cylinder - Replace 184
Fuel System - Fill 187
Fuel System Water Separator - Drain 191
Fuel System - Prime 192
Fuel Tank Water and Sediment - Drain 192
Fuses, Circuit Breakers and Relays - Replace/Reset 193
Oil Filter - Inspect 207
Radiator Core - Clean 209
Right Side Access Ladder - Install/Remove 211
Window Washer Reservoir - Fill 226
Window Wipers - Inspect/Replace 227

Every 10 Service Hours or Daily

Air Conditioner Condenser - Clean 156
Braking System - Test 160
Brakes, Indicators and Gauges - Test 161
Cooling System Level - Check 169
Engine Oil Level - Check 182
Fire Extinguisher - Inspect 185
Hydraulic System Oil Level - Check 204
Quick Hitch - Lubricate 209
Slotted Cast Drive Wheel Scrapers - Check 215
Three-Point Hitch-Lubricate 217
Transmission Oil Level - Check 220
Walk-Around Inspection 222
Windows - Clean 225

Every 50 Service Hours

Cassette Player Head - Clean 162
Parking Brake - Adjust 208

Every 100 Service Hours

Air Spring Pressure - Check 158
Differential and Final Drive Oil Level - Check 172
Front Idler Hubs Oil Level - Check 187

Every 250 Service Hours

Air Conditioner - Test 155
Air Conditioner Belt - Inspect/Adjust/Replace 155
Alternator and Fan Belts - Inspect/Adjust/Replace 159
Battery - Inspect 159
Cooling System Additive (DEAC) - Add 163
Differential and Final Drive Oil Sample - Obtain .. 173
Engine Crankcase Breather - Clean 180
Engine Oil and Filter - Change 181
Engine Oil Sample - Obtain 183
Fuel System Primary Filter/Water Separator - Clean/Replace 189
Fuel System Secondary Filter - Replace 190
Fuel Vent Breather - Clean 193
Steering and Hydraulic System Oil Sample - Obtain 215
Transmission Oil Sample - Obtain 221

Every 500 Service Hours

Cooling System Coolant Sample - Obtain 166
Front Axle - Lubricate 185
Main Drive Shaft Slip Spline - Lubricate 205
Power Take-Off Drive Shaft - Lubricate 209
Steering System Oil Filter - Replace 216
Transmission Oil Filter - Replace 219

Every 1000 Service Hours

Differential and Final Drive Oil and Screens - Change/Clean 170
Front Idler Hubs Oil - Change 185
Hydraulic System Oil - Change 202
Hydraulic System Oil Return Filter - Replace 205
Midwheel Hub Oil Level - Check 206
Rollover Protective Structure (ROPS) - Inspect .. 211
Service Brake Disc Wear - Check 212
Slotted Cast Drive Wheel Scrapers - Adjust 213
Transmission Breather - Clean 217
Transmission Oil - Change 218

Every 1000 Service Hours or 1 Year

Air Conditioner Desiccant Receiver/Dryer - Replace 157
Engine Air Filter Primary Element - Replace 177

Every 2000 Service Hours

Electronic Unit Injectors - Test 175
Engine Valve Lash - Check 184
Parking Brake Pads - Inspect/Replace 208

Every Year

Cooling System Coolant Sample - Obtain 166
Seat Belt - Inspect 212

Every 3000 Service Hours

Cooling System Extended Life Coolant Extender - Add 168

Every 3000 Service Hours or 2 Years

Cooling System Coolant (DEAC) - Change 164

Every 3 Years

Seat Belt - Replace 212

Every 6000 Service Hours or 6 Years

Cooling System Extended Life Coolant - Change 166
Radiator Pressure Cap - Clean/Replace 211

Between 250 Service Hours and 1000 Service Hours (or between first and fourth oil change)

Engine Valve Lash - Check 184

i00805495

Air Conditioner - Test

SMCS Code: 7320-081

WARNING

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas can cause bodily harm or death. Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Check Suction Line

Perform this procedure when the ambient air temperature is at least 21°C (70°F).

1. Start the engine. Operate the engine at 2000 rpm.
2. Set the air conditioner control for maximum cooling. Set the fan speed switch to HIGH SPEED.
3. Allow the air conditioning system to run for ten minutes in order to stabilize the air conditioning system.
4. Raise the hood in order to access the air conditioner condenser.

Note: See Operation and Maintenance Manual, “Engine Compartment Hood - Raise/Lower”.

5. Feel the suction line and the discharge line in order to check the system for refrigerant.

   If the system contains refrigerant, the discharge line will be warmer than the suction line.

   If the system contains no refrigerant or the system contains only a small amount of refrigerant, poor cooling will result.

i01286267

Air Conditioner Belt - Inspect/Adjust/Replace

SMCS Code: 1357-025; 1357-040; 1357-510

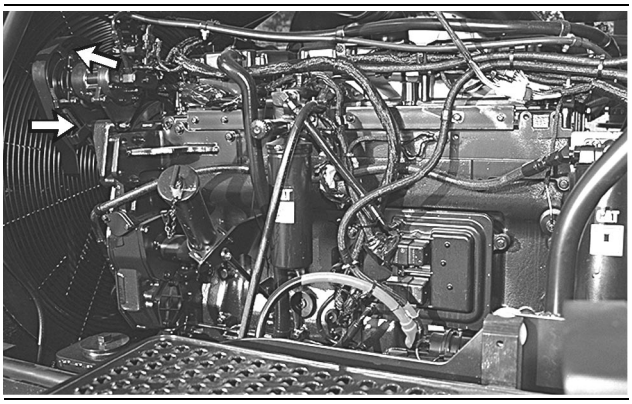


Illustration 228 g00375599

1. Raise the hood in order to access the air conditioner belts.
2. Inspect the condition and adjustment of the belts. If the belts are damaged, replace the belts in sets.

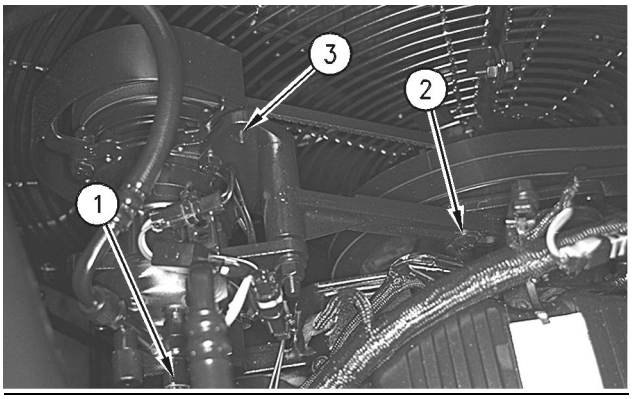


Illustration 229 g00376232

3. Loosen mounting bolt (1).
4. Loosen strap bolt (2).
5. Rotate the compressor in order to adjust belt tension. Use a 1/2 inch breaker bar in square hole (3).

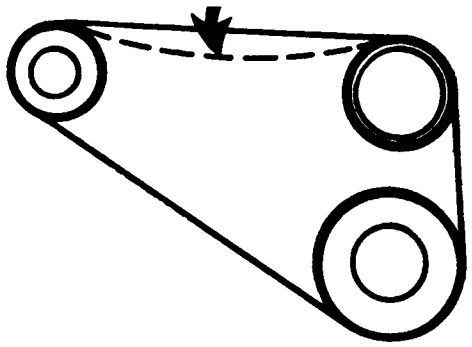


Illustration 230 g00375611

6. Apply approximately 110 N (25 lb) force midway between the pulleys. Measure the deflection of the belt.

   Correctly adjusted belts will deflect 14 to 20 mm (0.56 to 0.81 inch).

7. Tighten strap bolt (2) and mounting bolt (1).

8. Measure the belt tension. If the belt deflection is not correct, repeat this procedure.

i00799701

Air Conditioner Condenser - Clean

SMCS Code: 7320-070

Illustration 231 g00377172

1. Raise the hood.

Note: See Operation and Maintenance Manual, “Engine Compartment Hood-Raise/Lower”.

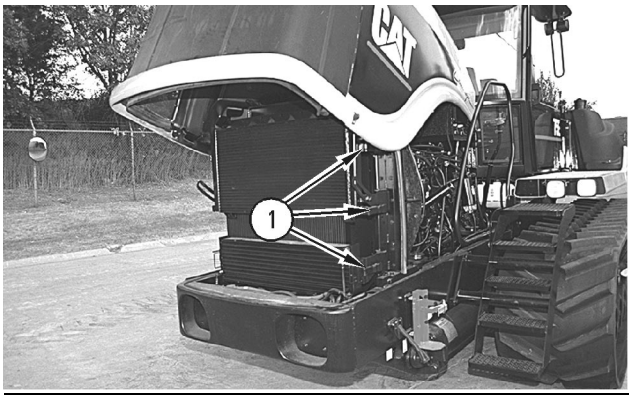


Illustration 232 g00377898

2. Unlatch cooler latches (1).

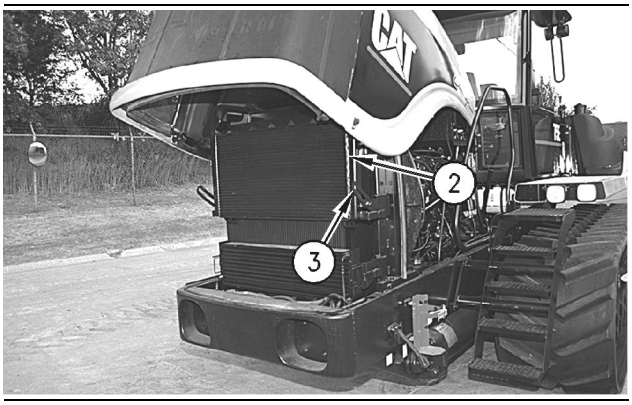


Illustration 233 g00378017

3. Raise air cooler (2).

4. Secure air cooler (2) with support (3).

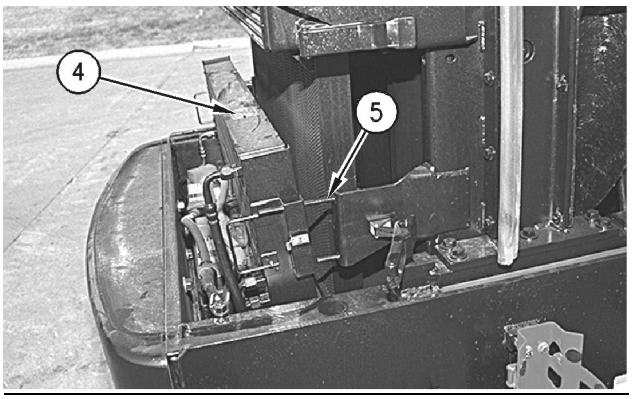


Illustration 234 g00378152

5. Use the handles on each side. The condenser core moves on the slides (5). Pull out air conditioning condenser core (4).

6. Direct pressurized air or direct pressurized water at the condenser. Clean the condenser core of foreign material. The use of compressed air is preferred. Blow out the debris from the fan side first. Then clean debris from the front compartment.

Note: Use pressurized air with a maximum pressure of 205 kPa (30 psi). Use pressurized water with a maximum pressure of 280 kPa (40 psi).

7. After cleaning, push condenser core (4) against the mounting plates. Engage latches.

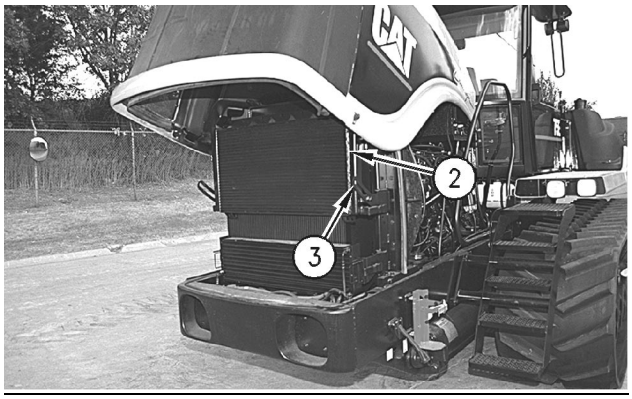


Illustration 235 g00378017

8. In order to disengage support (3), lift the support. Lower air cooler (2). Secure air cooler (2) with the rubber latches.

Illustration 236 g00377172

9. Lower the hood.

Note: See Operation and Maintenance Manual, “Engine Compartment Hood-Raise/Lower”.

i00803697

Air Conditioner Desiccant Receiver/Dryer - Replace

SMCS Code: 7320-510-DSS

Replace the receiver-dryer in the system. Consult any Caterpillar dealer for the correct procedure and instructions.

Note: Use the pressure in the Service Manual to check the charge. The charge is the pressure for the R-134A refrigerant.

i01183049

Air Conditioner Drain Line - Clean

SMCS Code: 7320-070-QN

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

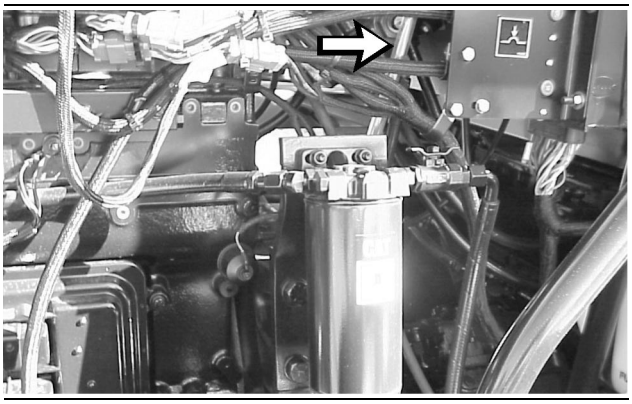


Illustration 237 g00633494

The drain line for the air conditioner is located on the left side of the engine compartment.

Remove any debris or dirt in the drain line for the air conditioner. This line removes condensate from the air conditioner coils. A plugged line can cause water to accumulate. The accumulated water will soak the air filter.

i01191067

Air Spring Pressure - Check

SMCS Code: 4193-535

⚠ WARNING

Use a self-attaching inflation chuck and stand behind the belt when inflating springs to prevent possible personal injury.

Proper inflation equipment, and training in using the equipment, are necessary to avoid overinflation.

A blowout can result from improper or misused equipment.

NOTICE

Set the inflation equipment regulator at no more than 140 kPa (20 psi) over the recommended pressure to prevent air spring damage.

A inflated spring in an enclosed shop at a temperature of 19.5° ± 1.5°C (67° ± 2.7°F) is underinflated if the machine works in freezing temperatures. Inflate the suspension springs to the usual operating temperature of the machine.

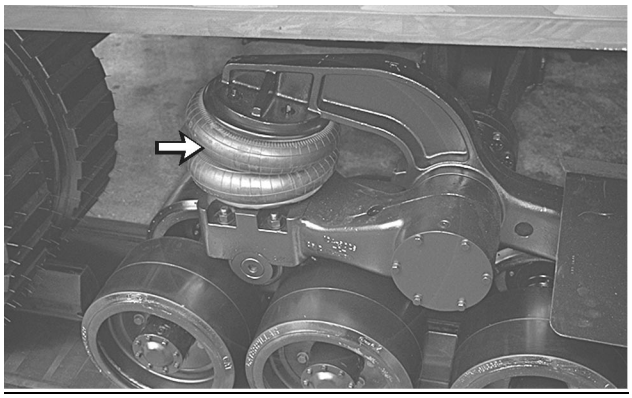


Illustration 238 g00406898

Table 45

Inflation	
Operating Weight	**Inflation Pressure**
14075 kg (31000 lb)	448 ± 34 kPa (65 ± 5 psi)
15450 kg (34000 lb)	517 ± 34 kPa (75 ± 5 psi)
17025 kg (37500 lb)	552 ± 34 kPa (80 ± 5 psi)
18600 kg (41000 lb)	586 ± 34 kPa (85 ± 5 psi)

Note: An increase in the air pressure increases the percentage of the machine weight to the midwheels. Increasing the air pressure offers the following benefits:

- The performance of the steering can be increased, especially while the machine is under load.
- The quality of the ride improves because the midwheels absorb a greater amount of the shock loads.

An air spring with insufficient pressure can cause poor turning performance under load and an increased roughness of ride.

The ideal pressure for the air springs can vary between 414 to 621 kPa (60 to 90 psi). The ideal pressure will depend on the following conditions: type of equipment, condition of the soil, and performance requirements. Various pressures should be tried in order to find the ideal setting for the particular situation. Do not exceed 650 kPa (95 psi).

i01183061

Alternator and Fan Belts - Inspect/Adjust/Replace

SMCS Code: 1357-025; 1357-040; 1357-510

Inspect Belt Tension

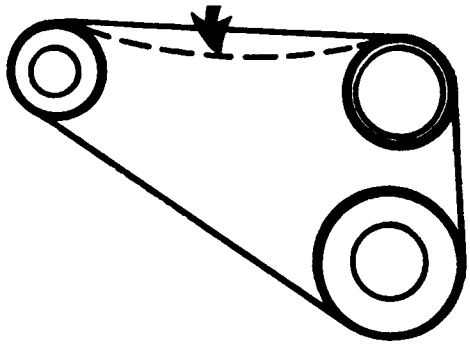


Illustration 239 g00375611

1. Raise the hood in order to access the alternator belt.

Note: See Operation and Maintenance Manual, “Engine Compartment Hood - Raise/Lower”.

2. Inspect the condition of the belt. Replace any belt that is excessively worn.

3. In order to check the belt tension, apply 110 N (25 lb) force midway between the pulleys. Correctly adjusted belts will deflect 14 mm (0.55 inch) to 20 mm (0.79 inch).

4. If the belt deflection is not correct, adjust the belt.

Adjust Belt Tension

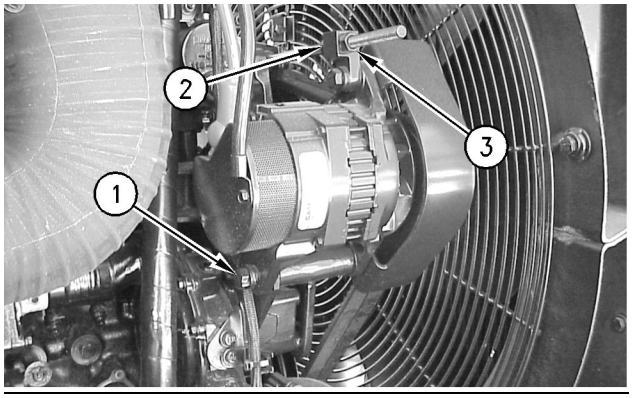


Illustration 240 g00633504

1. Loosen pivot bolt (1) and adjustment nuts (2) and (3).

2. Adjust nuts (2) and (3) in order to loosen or tighten belts.

3. Tighten pivot bolt (1).

4. Measure the belt tension. If the belt deflection is not correct, repeat this procedure.

i00808497

Battery - Inspect

SMCS Code: 1401-040

⚠ WARNING

Batteries give off flammable fumes that can explode resulting in personal injury.

Prevent sparks near the batteries. They could cause vapors to explode. Do not allow the jump start cable ends to contact each other or the machine.

Do not smoke when checking battery electrolyte levels.

Electrolyte is an acid and can cause personal injury if it contacts skin or eyes.

Always wear eye protection when starting a machine with jump start cables.

Improper jump start procedures can cause an explosion resulting in personal injury.

Always connect the battery positive (+) to battery positive (+) and the battery negative (–) to battery negative (–).

Jump start only with an energy source with the same voltage as the stalled machine.

Turn off all lights and accessories on the stalled machine. Otherwise, they will operate when the energy source is connected.

Illustration 241 g00383593

Raise the hood.

Note: See Operation and Maintenance Manual, “Engine Compartment Hood-Raise/Lower” .

Tighten the battery retainers on all batteries. Perform the following requirements:

- Clean the top of the batteries with a clean cloth.
- Keep the terminals clean and coated with petroleum jelly.

i00058390

Battery - Recycle

SMCS Code: 1401-561

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

- A battery supplier
- An authorized battery collection facility
- Recycling facility

i00811471

Braking System - Test

SMCS Code: 4100-081; 4267-081

Turn off the engine. The pedal should move with light pedal effort for approximately one quarter of the total travel. At this point, pedal effort should increase substantially. If the engine is turned off, the brakes may be spongy. The brake system accumulator is depleted. Start the engine in order to charge the brake system accumulator.

Note: Consult any Caterpillar dealer, or refer to the Service Manual for the procedure for purging air from the brakes and for troubleshooting. Do not operate the machine until the brakes are functioning properly.

The transmission control should be in the NEUTRAL position and the parking brake should be engaged before performing this test.

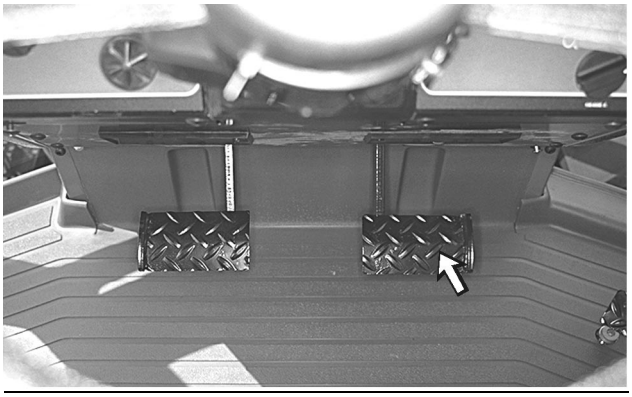


Illustration 242 g00385335

1. Turn off the engine. Depress the brake pedal several times until pedal effort becomes much lighter. This action depletes the pressure in the brake system accumulator.
2. Start the engine. Allow the engine to run for 30 seconds.

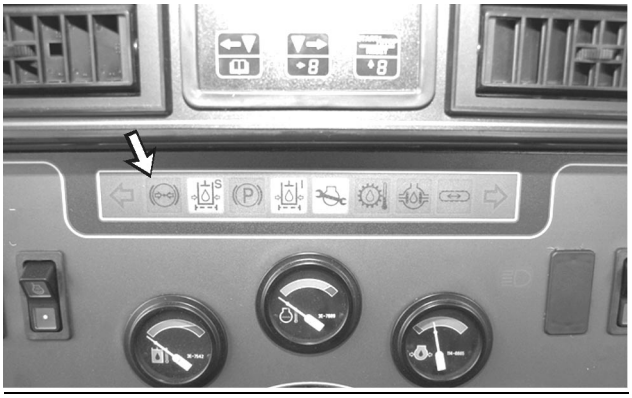


Illustration 243 g00385433

3. The accumulator pressure indicator for the brakes should turn off. If the accumulator pressure indicator does not turn off, do not operate the machine. Consult any Caterpillar dealer for more information.

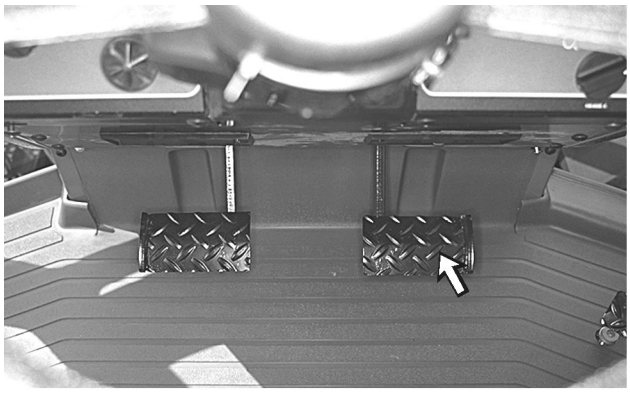


Illustration 244 g00385335

4. Depress the brake pedal. The pedal effort should now be firmer. If the pedal effort is not firmer do not operate the machine. Consult any Caterpillar dealer for more information.

i01158299

Brakes, Indicators and Gauges - Test

SMCS Code: 4100-081; 7000-081; 7450-081

Illustration 245 g00386456

Check for inoperative gauges. Check for inoperative switches and/or burned indicator lamps.

Start the engine.

Stop the engine. Make any needed repairs before you operate the machine.

The indicator lamps can be checked. Use the following procedure:

1. Turn off the engine.

2. Engage the parking brake.

3. Shift the transmission out of the NEUTRAL position. Apply the inching clutch pedal.

4. Turn the engine start switch key to the START position. The starter should not engage.

5. Check all lights for operation. All lights should be on except for the turn signals, the hazard lights, and the high beam indicator. Check the high beam for operation. See Operation and Maintenance Manual, “Light Switches”.

6. Check the warning alarm for operation. The alarm should beep continuously.

7. Return the transmission control to the NEUTRAL position. The alarm should stop.

8. Turn the engine start switch key to the OFF position.

i00984017

Cab Air Filter - Clean/Replace

SMCS Code: 7342-070-FI; 7342-510-FI

Clean the cab air filter when there is a significant reduction in cab air circulation.

1. Turn the engine start switch key to the OFF position.

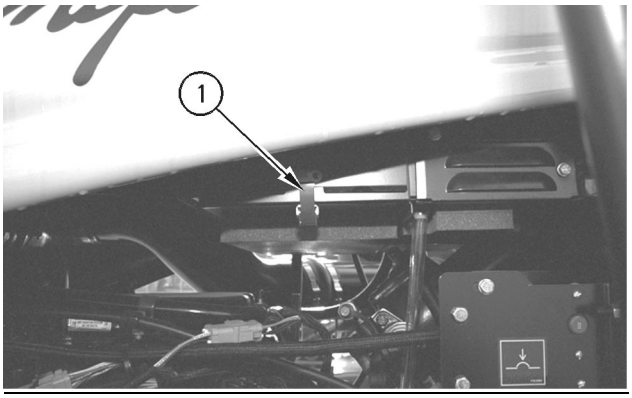


Illustration 246 g00409758

2. Release latch (1) in order to access the cover.

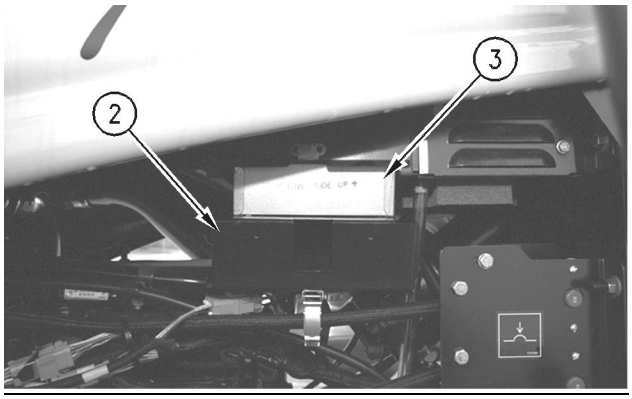


Illustration 247 g00409798

3. Lower tray (2).

4. Remove element (3).

5. Inspect the filter element for damage. Do not use a damaged filter element.

6. Clean the filter element. See “Cleaning Filter Elements”.

7. Clean the filter housing with a damp cloth.

Note: Do not use pressure air in order to clean the tray. Pressure air could move dust into the cab.

8. Install the new filter or the clean filter. Make sure that the filter is properly seated. The rubber seal should face upward. The metal grill should face downward.

9. Lift tray (2).

10. Secure the tray with latch (1).

Cleaning Filter Elements

Clean the filter element with pressure water or clean the filter element with pressure air.

Do not tap the filter element in order to clean the element.

Whenever you use pressure water, use a maximum pressure of 280 kPa (40 psi). Do not use a nozzle.

Whenever you use pressure air, use a maximum pressure of 205 kPa (30 psi).

1. Wash the element in a solution that consists of warm water and of nonsudsing household detergent. Soak the element for at least 15 minutes. Do not soak the element for more than 24 hours. Agitate the element in order to loosen dirt particles.

2. Rinse the filter element with clean water. Rinse the filter from the clean side toward the dirty side.

3. Air dry the element by circulating warm air. The air should be less than 71°C (160°F). Do not use a light bulb in order to dry the filter. Inspect the element for visible debris.

After you clean the element, inspect the element. Do not use an element that has damaged pleats, damaged gaskets, or damaged seals.

i00834918

Cassette Player Head - Clean

SMCS Code: 7338-070

Note: Failure to clean the cassette player’s head after 24 hours of playing time may result in damage to the head.

Note: The 136-5646 Cassette Cleaning Kit contains all of the items that are needed for this procedure. Consult any Caterpillar dealer for a 136-5646 Cassette Cleaning Kit.

1. In order to clean the cleaner cassette, saturate the pads with the cassette’s cleaning fluid.

2. Insert the cleaner cassette into the cassette player.

3. Play the cleaner cassette for twenty seconds.

4. Remove the cleaner cassette. Store the cleaner cassette in a clean, dry place.

i00813182

Cooling System Additive (DEAC) - Add

SMCS Code: 1352-044

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and cooling system pressure cap is cool enough to touch with your bare hand.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

See the appropriate topics in your machine’s Operation and Maintenance Manual for all cooling system requirements.

Use 8T-5296 Test Group to check the concentration of the coolant.

If necessary, add supplemental coolant additive.

NOTICE

Do not exceed the recommended six percent supplemental coolant additive concentration. Excessive supplemental coolant additive concentration can form deposits on the higher temperature surfaces of the cooling system, reducing the engine’s heat heat transfer characteristics. Reduced heat transfer could cause cracking of the cylinder head and other high temperature components. Excessive supplemental coolant additive concentration could also result in radiator tube blockage, overheating, and/or accelerated water pump seal wear. Never use both liquid supplemental coolant additive and the spin-on element (if equipped) at the same time. The use of those additives together could result in supplemental coolant additive concentration exceeding the recommended six percent maximum.

1. Park the machine on a hard, level surface. Allow the engine to cool and allow the radiator to cool.

Illustration 248 g00387093

2. Raise the hood in order to access the radiator.

Note: See Operation and Maintenance Manual, “Engine Compartment Hood - Raise/Lower”.

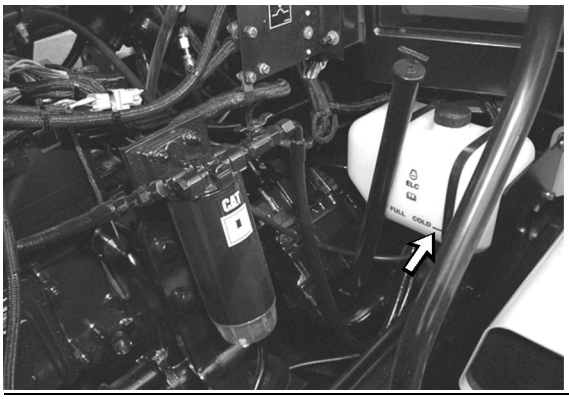


Illustration 249 g00388695

3. Coolant should be visible in the coolant recovery bottle. Drain some coolant from the radiator into a suitable container in order to allow space for the extra coolant additive. Add supplemental coolant additive.

Note: Always discard drained fluids according to local regulations.

4. Add 0.24 L (.50 pint) of supplemental coolant additive.

5. Inspect the filler cap gasket. Replace the filler cap if the gasket is damaged.

6. Install the filler cap.

i01191059

Cooling System Coolant (DEAC) - Change

SMCS Code: 1352; 1395-044

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and cooling system pressure cap is cool enough to touch with your bare hand.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

See the appropriate topics in your machine's Operation and Maintenance Manual for all cooling system requirements.

Change the engine coolant more frequently if you find any of the following conditions:

- The cooling system is heavily contaminated.
- The engine overheats.
- You observe foaming in the radiator.
- The oil cooler has failed and oil is in the coolant.
- Fuel has contaminated the cooling system.
- The cooling system contains non-Caterpillar products.

It is important to replace the thermostat in order to avoid any unexpected failure of the thermostat. This is a good preventive maintenance practice that reduces the chances of unscheduled downtime. Failure to replace the thermostat on a regularly scheduled basis could cause severe engine damage.

Note: If you are only replacing the thermostat, drain the coolant from the cooling system so that the level of the coolant is below the thermostat housing.

Always operate Caterpillar engines with a thermostat because these engines have a shunt design cooling system.

Note: Thermostats can be reused if the thermostats meet certain test specifications. The tested thermostats must not be damaged and the tested thermostats must not have an excessive buildup of deposits.

1. Park the machine on a hard, level surface. Allow the engine to cool and allow the radiator to cool.

2. Raise the hood in order to access the radiator.

Note: See Operation and Maintenance Manual, “Engine Compartment Hood - Raise/Lower”.

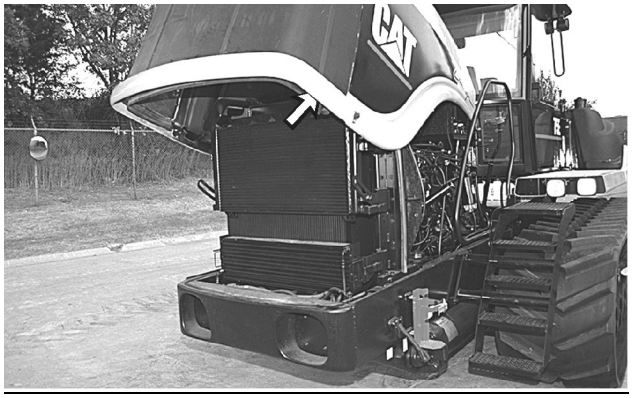


Illustration 250 g00387093

3. Slowly loosen the filler cap in order to relieve the pressure. Remove the filler cap.

4. Inspect the filler cap gasket. Replace the filler cap if the gasket is damaged.

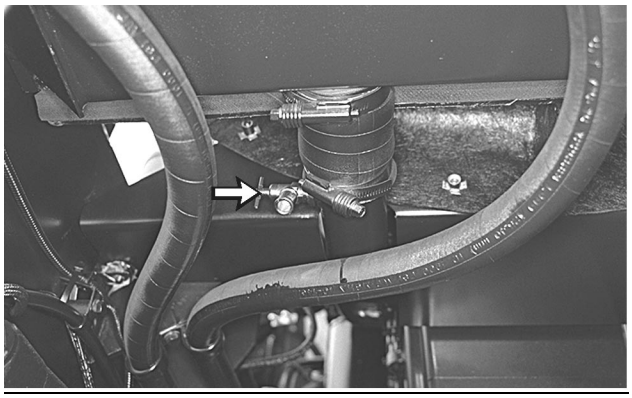


Illustration 251 g00387852

5. Attach a hose to the nipple on the drain valve. Open the drain valve that is under the radiator. Allow the coolant to drain into a suitable container.

Note: Always discard drained fluids according to local regulations.

6. Close the drain valve. Fill the cooling system with clean water and with a 6 to 10% concentration of cooling system cleaner. Install the filler cap.

7. Start the engine. Run the engine for 90 minutes.

8. Stop the engine. Drain the cleaning solution.

9. Flush the cooling system with water until the draining water is transparent. Fully drain the cooling system.

10. Close the drain valve.

11. Add the coolant solution. See Operation and Maintenance Manual, “Refill Capacities”.

Note: At this time, do not add any supplemental coolant additive if you are using Caterpillar Extended Life Coolant that contains some additive.

12. Start the engine. Operate the engine until the coolant reaches the normal operating temperature and until the coolant level stabilizes.

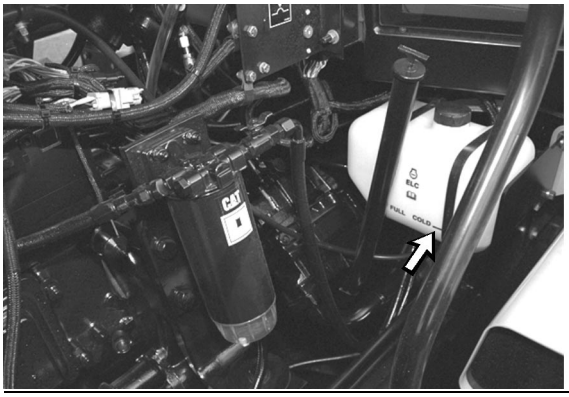


Illustration 252 g00388695

13. Coolant should be visible in the coolant recovery bottle. As needed, add coolant.

14. Install the filler cap.

15. Stop the engine.

Clean Cooling System Relief Valve

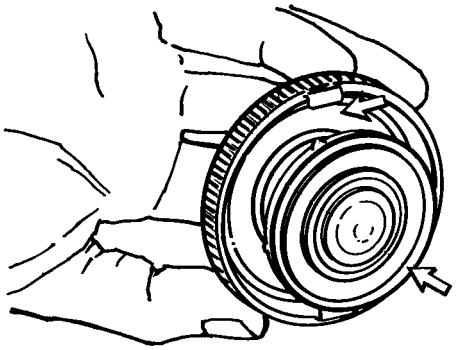


Illustration 253 g00388704

Clean the relief valve or replace the relief valve if the system overheats or loss of coolant is observed.

1. Remove the radiator cap slowly in order to relieve the pressure.

2. Inspect the relief valve and the gasket in the radiator cap. Replace the radiator cap, if the valve or the gasket are worn or damaged.

i01218018

Cooling System Coolant Sample - Obtain

SMCS Code: 1350-008; 1350-554-SM; 1352-008; 1395-008; 1395

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE
Do not use the same vacuum sampling pump for extracting oil samples that is used for extracting coolant samples.

A small residue of either type sample may remain in the pump and may cause a false positive analysis for the sample being taken.

Always use a designated pump for oil sampling and a designated pump for coolant sampling.

Failure to do so may cause a false analysis which could lead to customer and dealer concerns.

Testing the coolant can be done at your Caterpillar dealer. Caterpillar S·O·S Coolant Analysis is the best way to monitor the condition of your coolant and your cooling system. S·O·S Coolant Analysis is a program that is based on periodic samples.

Level I is a basic analysis which should be performed for DEAC and Extended Life Coolant (ELC). The sample should be obtained after every 500 hours of use. See Operation and Maintenance Manual, “S.O.S Coolant Analysis” for more information.

Level II is a comprehensive analysis which should be performed annually. See Operation and Maintenance Manual, “S.O.S Coolant Analysis” for more information.

i01158341

Cooling System Extended Life Coolant - Change

SMCS Code: 1350; 1395-044-NL

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and cooling system pressure cap is cool enough to touch with your bare hand.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Mixing ELC with other products reduces the effectiveness of the ELC and shortens the ELC service life. Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specification for premixed or concentrate coolants. Use only Caterpillar ELC Extender with Caterpillar ELC. Failure to follow these recommendations can result in shortened cooling system component life.

See the appropriate topics in your machine's Operation and Maintenance Manual for all cooling system requirements.

Note: For more information about Extended Life Coolant (ELC), see Operation and Maintenance Manual, "Extended Life Coolant (ELC)".

Some engines utilize Extended Life Coolant (ELC). See the Operation and Maintenance Manual, "Maintenance Interval Schedule" for the proper service interval. If an ELC was previously used, flush the cooling system with clean water. No other cleaning agents are required.

Change the engine coolant more frequently if you find any of the following conditions:

- The cooling system is heavily contaminated.
- The engine overheats.
- You observe foaming in the radiator.
- The oil cooler has failed and oil is in the coolant.
- Fuel has contaminated the cooling system.
- The cooling system contains non-Caterpillar products.

It is important to replace the thermostat in order to avoid any unexpected failure of the thermostat. This is a good preventive maintenance practice that reduces the chances of unscheduled downtime. Failure to replace the thermostat on a regularly scheduled basis could cause severe engine damage.

Note: If you are only replacing the thermostat, drain the coolant from the cooling system so that the level of the coolant is below the thermostat housing.

Always operate Caterpillar engines with a thermostat because these engines have a shunt design cooling system.

Note: Thermostats can be reused if the thermostats meet certain test specifications. The tested thermostats must not be damaged and the tested thermostats must not have an excessive buildup of deposits.

1. Park the machine on a hard, level surface. Allow the engine to cool and allow the radiator to cool.
2. Raise the hood in order to access the radiator.

Note: See Operation and Maintenance Manual, "Engine Compartment Hood - Raise/Lower".

Illustration 254 g00387093

3. Slowly loosen the filler cap in order to relieve the pressure. Remove the filler cap.
4. Inspect the filler cap gasket. Replace the filler cap if the gasket is damaged.

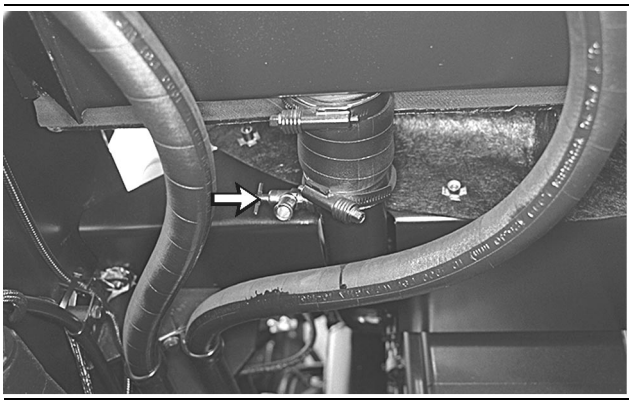


Illustration 255 g00387852

5. Attach a hose to the nipple on the drain valve. Open the drain valve that is under the radiator. Allow the coolant to drain into a suitable container.

Note: Always discard drained fluids according to local regulations.

6. Flush the cooling system with water until the draining water is transparent. Fully drain the cooling system.

7. Close the drain valve.

8. Add the coolant solution. Refer to Operation and Maintenance Manual, “Refill Capacities”.

9. Start the engine while the filler cap is removed. Operate the engine until the coolant reaches the normal operating temperature and until the coolant level stabilizes.

10. As needed, add coolant. Maintain the coolant level to the bottom of the filler pipe.

11. Install the filler cap.

i00816008

Cooling System Extended Life Coolant Extender - Add

SMCS Code: 1350; 1352-544-NL; 1395-544-NL

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and cooling system pressure cap is cool enough to touch with your bare hand.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Mixing ELC with other products reduces the effectiveness of the ELC and shortens the ELC service life. Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specification for premixed or concentrate coolants. Use only Caterpillar ELC Extender with Caterpillar ELC. Failure to follow these recommendations can result in shortened cooling system component life.

See the appropriate topics in your machine’s Operation and Maintenance Manual for all cooling system requirements.

Note: For more information about Extended Life Coolant (ELC), see Operation and Maintenance Manual, “Extended Life Coolant (ELC)”.

When a Caterpillar Extended Life Coolant (ELC) is used, an extender must be added to the cooling system. See the Operation and Maintenance Manual, “Maintenance Interval Schedule” for the proper service interval.

Refer to Table 46 for the recommended amount of Extender. With the exception of adding the Extender and maintaining your coolant level, no other maintenance is required.

Table 46

Recommended Amount of Extender By Cooling System Capacity			
Model	**System**	**Cooling System Capacity**	**Recommended Amount of Extender**
Challenger 65E and Challenger 75E	Folded Core Radiator	50 to 64 L (13 to 17 US gal)	1.18 L (40 fl oz)
Challenger 65E and Challenger 75E	Multiple Row Module Radiator	65 to 83 L (17 to 22 US gal)	1.60 L (54 fl oz)
Challenger 85E and Challenger 95E	Standard Radiator	65 to 83 L (17 to 22 US gal)	1.60 L (54 fl oz)

1. Park the machine on a hard, level surface. Allow the engine to cool and allow the radiator to cool.

Illustration 256 g00387093

2. Raise the hood in order to access the radiator.

Note: See Operation and Maintenance Manual, “Engine Compartment Hood - Raise/Lower”.

3. Coolant should be visible in the coolant recovery bottle. If necessary, drain some of the coolant from the radiator into a suitable container in order to allow space for the Extender.

Note: Always discard drained fluids according to local regulations.

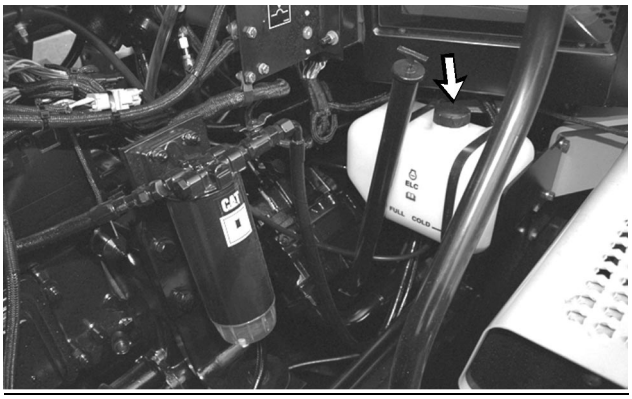


Illustration 257 g00393145

4. Slowly loosen the filler cap in order to relieve the pressure. Remove the filler cap.

5. Inspect the filler cap gasket. Replace the filler cap if the gasket is damaged.

6. Add the recommended amount of Caterpillar Extender to the cooling system.

7. Install the filler cap.

i01191079

Cooling System Level - Check

SMCS Code: 1350-535-FLV; 1395-535-FLV

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and cooling system pressure cap is cool enough to touch with your bare hand.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE
Do not use a conventional coolant to top-off a cooling system using Extended Life Coolant.

Do not use supplemental coolant additives (SCA) other than Extender in cooling systems filled with Extended Life Coolant.

See the appropriate topics in your machine’s Operation and Maintenance Manual for all cooling system requirements.

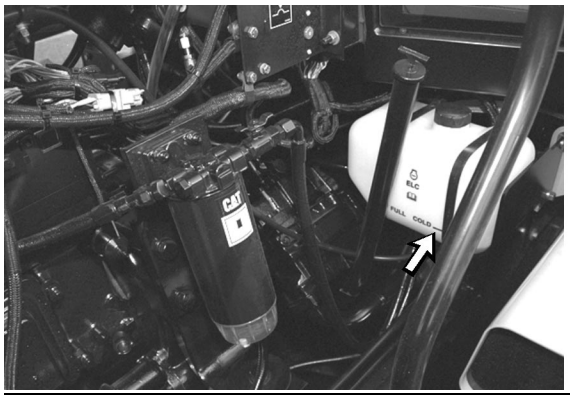


Illustration 258 g00388695

This machine uses a coolant recovery bottle that is similar to the coolant recovery bottles that are used in automotive applications. Once the engine is turned off and the coolant is cold, the coolant should be visible in the coolant recovery bottle.

If the engine coolant level is low, check the system for leaks. As needed, repair the cooling system. Use the following procedure in order to add coolant.

1. Park the machine on a hard, level surface. Allow the engine to cool and allow the radiator to cool.

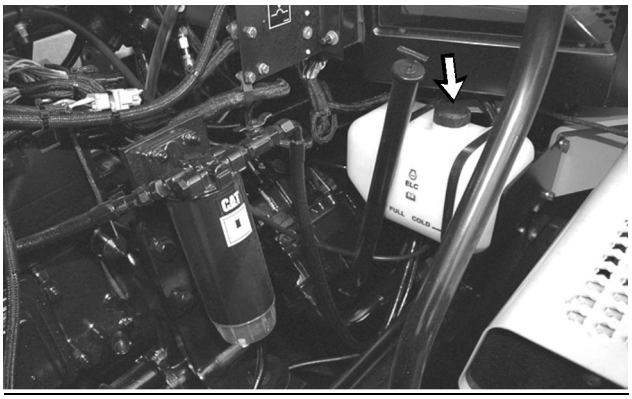


Illustration 259 g00393145

2. Slowly loosen the filler cap in order to relieve the pressure. Remove the filler cap.

3. Inspect the filler cap gasket. Replace the filler cap if the gasket is damaged.

4. As needed, add coolant. Maintain the coolant level to the bottom of the filler pipe.

5. Install the filler cap.

i01176380

Differential and Final Drive Oil and Screens - Change/Clean

SMCS Code: 3258-044; 4050-044; 4070

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Note: Operate the machine in order to warm the differential/final drive oil before you perform this procedure.

Note: At operating temperature, the differential/final drive oil is hot. See the Safety Section in this manual for information about hot oil and fluid penetration.

The magnetic drain plugs are located on the bottom of each final drive and on the PTO (if equipped).

Illustration 260 g00396137

1. Park the machine on a level surface.

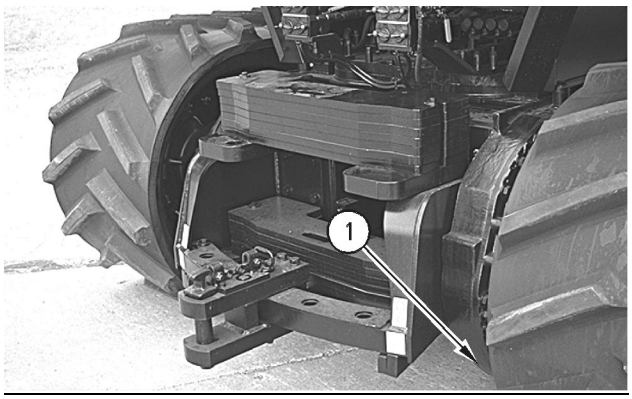


Illustration 261 g00396157

2. Remove drain plugs (1) on both sides. Clean drain plugs (1) on both sides. If the machine is equipped with a PTO, remove the drain plug at the bottom of the PTO. Allow the oil to drain into a suitable container. The container must have a minimum capacity of 209 L (55 US gal). Inspect the drain plug seals. Replace damaged seals. Install the drain plugs.

Note: The oil screen must be removed and cleaned if the differential or final drives are drained or disassembled for any reason.

The differential screen is located at the lower front of the differential. Access the differential screen. The differential screen is located underneath the tractor.

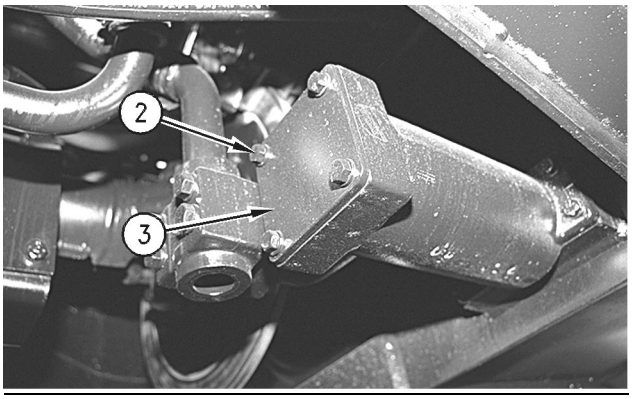


Illustration 262 g00396239

3. Remove bolts (2) and cover (3).

4. Remove the screen and magnets.

5. Remove the magnets from the screen.

6. Wash the screen and the magnets in a clean, nonflammable solvent. Allow the screen and magnets to dry.

7. Install the magnets into the screen.

8. Install the screen and the magnets into the screen housing.

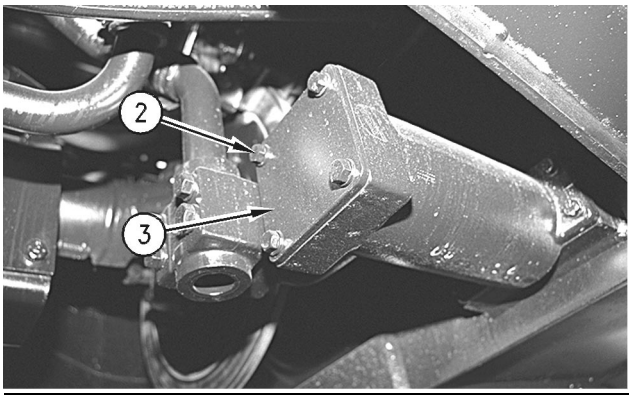


Illustration 263 g00396239

9. Install cover (3) and bolts (2).

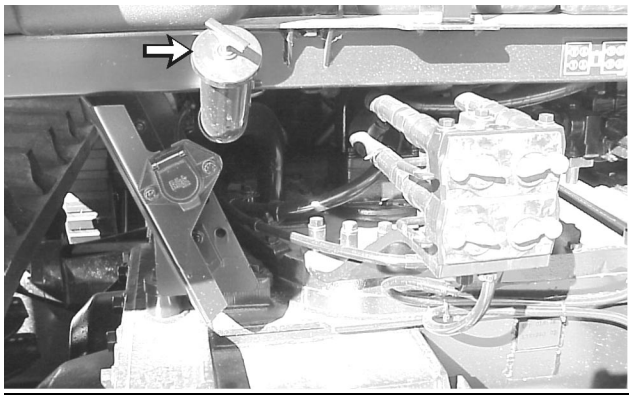


Illustration 264 g00629606

10. Remove the breather cap from the filler tube.

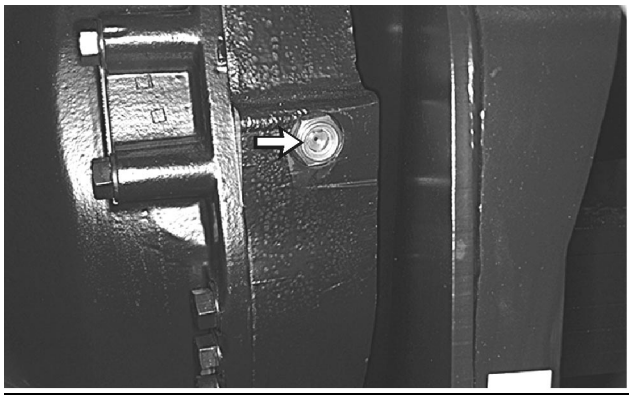


Illustration 265 g00396318

Illustration 266 g00633534

11. Add oil until the oil level is above the center of the oil level sight gauge.

12. Inspect the cap and the cap seal for damage, for deposits, or for foreign material. Clean the cap with a clean cloth. Replace a damaged cap.

13. Install the cap.

14. Start the engine and run the engine for at least five minutes. Check for leaks.

15. Stop the engine.

16. The oil level should be just above the center of the oil level sight gauge.

i01176401

Differential and Final Drive Oil Level - Check

SMCS Code: 3258-535-FLV; 4050-535-FLV; 4070

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

It is important that the vent cap is free to breath. If excessive vacuum or pressure is allowed to build up in the differential case, leakage of oil through the final drive seals may result.

Illustration 267 g00633525

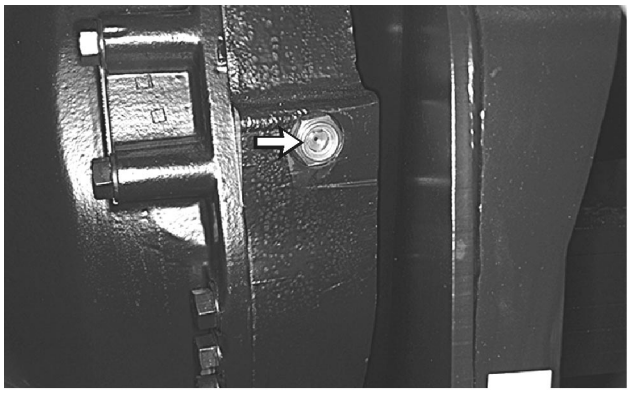


Illustration 268 g00396318

1. Park the machine on level ground. Check the oil level at the sight gauge at the rear of the final drive housing. The oil level should be above the center of the sight gauge.

Note: An inaccurate reading can occur if the machine is not level. Make sure that the machine is parked on level ground before you check the oil level or before you add oil.

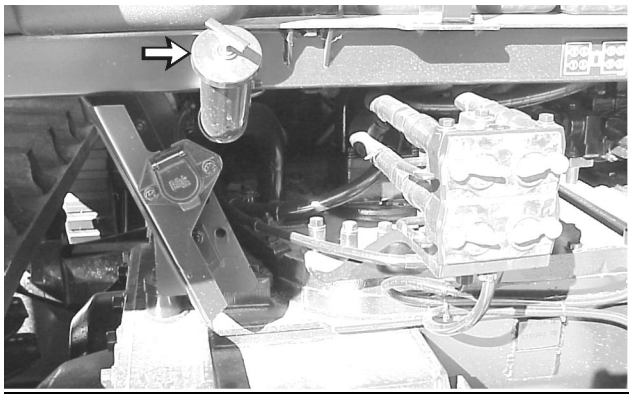


Illustration 269 g00629623

2. To add oil, remove the breather cap from the filler tube. The filler tube is located on the left rear of the machine. Add the oil so that the sight gauge registers the oil level above the center.

3. Clean the filler cap. Install the filler cap. Inspect the vent cap.

i01191090

Differential and Final Drive Oil Sample - Obtain

SMCS Code: 3258-008; 4050-008; 7542-008

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Obtain the sample of the differential and final drive oil as close as possible to the recommended sampling interval. The recommended sampling interval is every 250 service hours. In order to receive the full effect of S·O·S oil analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent oil samplings that are evenly spaced.

1. Before you obtain an S·O·S oil sample, operate the machine until the oil is warm and the oil is well circulated. Then obtain the S·O·S oil sample.

NOTICE

Do not use the same vacuum sampling pump for extracting oil samples that is used for extracting coolant samples.

A small residue of either type sample may remain in the pump and may cause a false positive analysis for the sample being taken.

Always use a designated pump for oil sampling and a designated pump for coolant sampling.

Failure to do so may cause a false analysis which could lead to customer and dealer concerns.

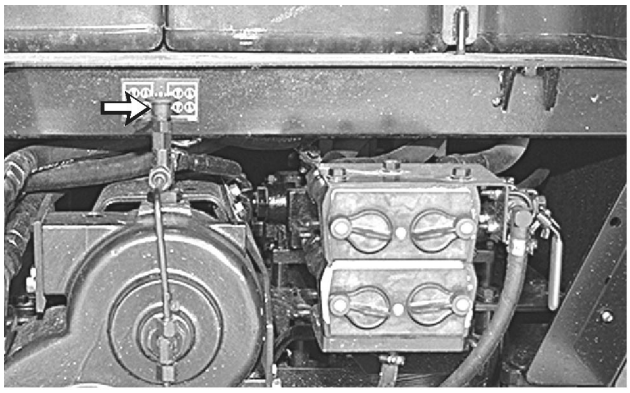


Illustration 270 g00637353

On machines that are equipped with a PTO, the location of the sampling valve for the differential and for the final drive is on top of the PTO.

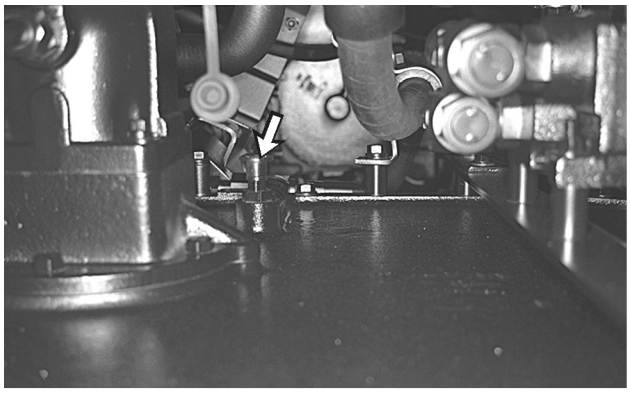


Illustration 271 g00399738

On machines without the PTO, the location of the differential and the final drive is on top of the differential case cover.

2. Use a sampling gun in order to obtain the oil sample from the sampling valve. Do not take the oil sample from the drain stream, because a stream of dirty oil from the bottom of the compartment will contaminate the sample. Likewise, never dip an oil sample from an oil container or pour a sample from a used filter.

Consult any Caterpillar Dealer for complete information and assistance about the S·O·S oil analysis program.

i00824934

Drawbar Wearplates, Swing Stops - Replace

SMCS Code: 7119-510-WK

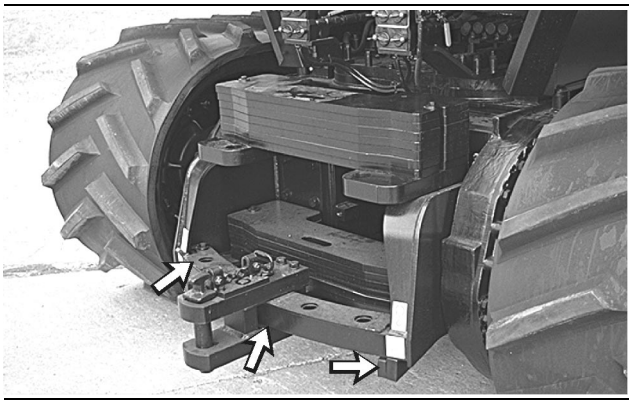


Illustration 272 g00397577

Replace the wearplates for the drawbar and for the drawbar support if the thinnest portion of the wearplate is worn to a minimum of 3 mm (0.12 inch).

1. Remove the drawbar pins.

2. Support the drawbar from the bottom. Lift the drawbar. 3 mm (0.12 inch) is the required height.

3. Remove the four bolts on the top plate from the drawbar.

4. Remove the top plate from the drawbar by lifting straight up. Use a rotating motion.

5. Replace the wearplates.

6. Install the top plate and the four bolts. Tighten the bolts to a torque of 475 ± 60 N·m (350 ± 44 lb ft).

7. Install the drawbar pins.

Replace swing stops when the rubber is worn or damaged.

i00826141

Electronic Unit Injectors - Test

SMCS Code: 1290-081

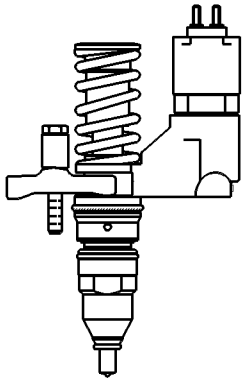


Illustration 273 g00398338

The recommended maintenance interval for performing preventive maintenance on the electronic unit injectors is based on experience and accumulated information regarding the expectant life of the engine and related components.

The electronic unit injectors should be tested prior to failure in order to identify improper operating electronic unit injectors. Test the electronic unit injectors at regularly scheduled intervals.

See the Special Instructions, “Using the 1N-6661 Pop (Injector) Tester, SEHS8867, and 1.1 Lite Fuel Injection Test Specifications, SEHS8884” for information and procedures to test the injectors. Test the fuel injectors for the following factors:

- Spray Test
- Valve Opening Pressure (VOP)
- External Leakage
- Leakdown Rate

Note: Do not use a fuel injector in the engine without testing. All test results are required to be within test specifications.

Caterpillar dealers have the tools and the trained personnel for this test.

i00828245

Engine Air Filter Primary Element - Clean

SMCS Code: 1051; 1054-070-PY

NOTICE
Service the air cleaner only with the engine stopped. Engine damage could result.

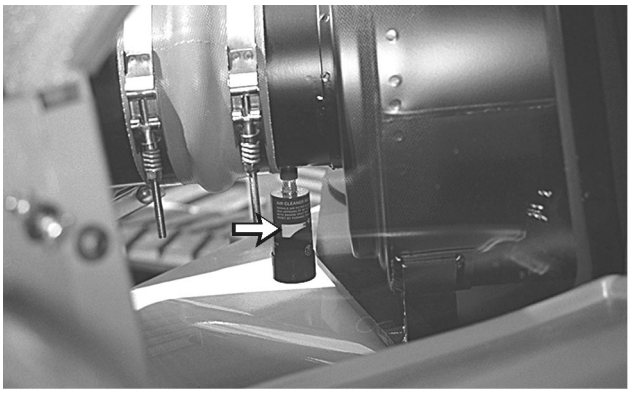


Illustration 274 g00401159

Run the engine at high idle. Service the air cleaner if the yellow piston in the filter element indicator moves into the red zone.

⚠ WARNING

Always service the air cleaner from the right fender only. DO NOT stand on the undercarriage, belt, or ground to service the air cleaner. Personal injury could result.

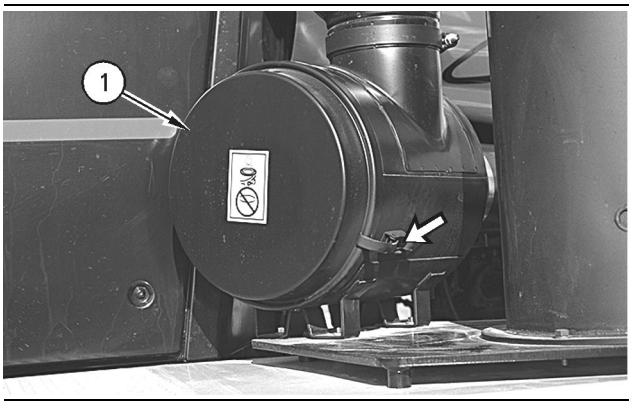


Illustration 275 g00401405

1. Slowly release the latches for the air cleaner housing. Remove cover (1).

Note: The latches for the air cleaner housing may snap open when you release the latches.

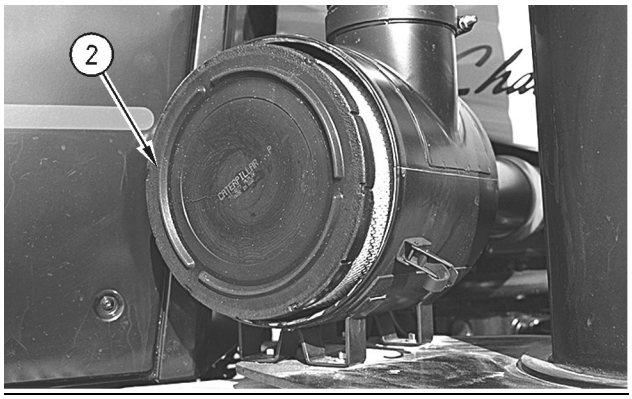


Illustration 276 g00401441

2. Remove primary filter element (2) from the air cleaner housing. In order to remove the engine air filter primary element, pull the element outward. While you pull the element outward, rock the element.

3. Inspect the primary element. If the pleats, the gaskets, or the seals are damaged, discard the element. Replace a damaged primary element with a clean primary element.

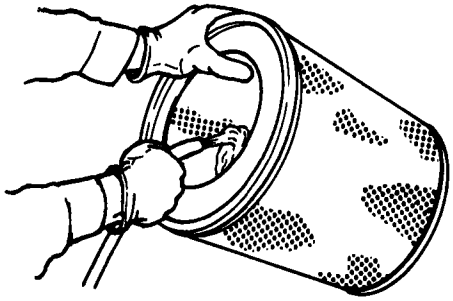


Illustration 277 g00039203

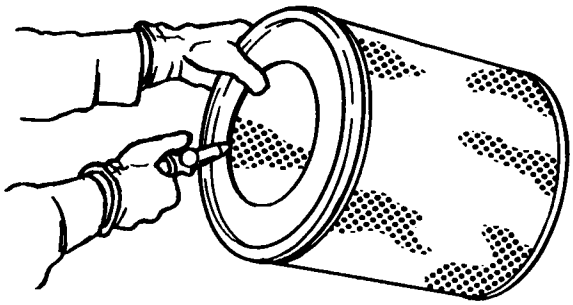


Illustration 278 g00328468

NOTICE

Do not clean the filter elements by bumping or tapping them. Do not use filter elements with damaged pleats, gaskets or seals. Engine damage can result.

Make sure the cleaned filter elements are completely dry before installing into the filter housing. Water remaining in the elements can cause false indications of contamination in Scheduled Oil Sampling test results.

4. If the primary element is not damaged, clean the primary element.

The filter elements can be cleaned by using the following methods:

- Pressure air
- Pressure water
- Detergent washing

When you use pressure air, the maximum air pressure is 205 kPa (30 psi). When you use pressure water, the maximum water pressure is 280 kPa (40 psi).

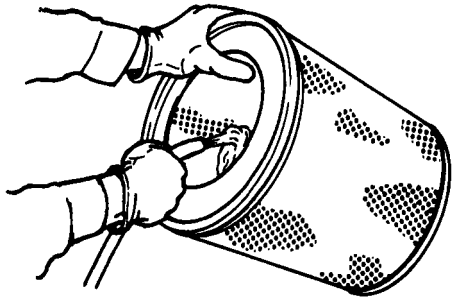


Illustration 279 g00039203

5. When you clean the inside pleats and the outside pleats, direct the air along the pleats or direct the water along the pleats.

The element can be washed in a solution that consists of warm water and of nonsudsing household detergent. Fully rinse the pleats. Allow the filter to air dry completely.

Engine air filter primary elements may be wet for three days. During this time, install a new primary element or install a dry, cleaned element. Store the dry element for installation at the next service.

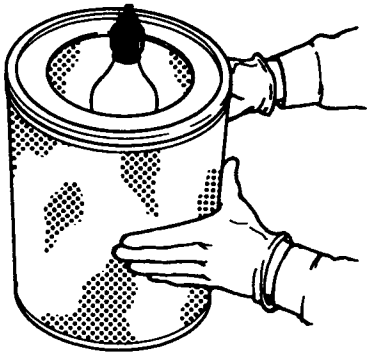


Illustration 280 g00328470

6. Inspect the filter element after you clean the filter element. Do not use a filter if the pleats, the gaskets or the seals are damaged.

Place a light bulb inside the filter element. Discard the filter element if you find any of the following conditions:

- Holes of light that are pin hole size
- Areas of paper that appear thin

7. Cover the clean filter elements. Store the elements in a clean, dry location.

A primary element may be cleaned for a maximum of six times. Also replace the primary element if the primary element has been used for one year.

8. Install a clean primary filter element over the engine air filter secondary element. Apply firm pressure to the end of the primary element as you gently rock the filter element. This seats the primary element.

9. Clean the cover for the air cleaner housing. Align the slot on the cover with the pin on the air cleaner housing. Install the cover.

10. Reset the air cleaner service indicator.

If the yellow piston in the filter element indicator moves into the red zone after starting the engine, or the exhaust smoke is still black after installation of a clean primary filter element, install a new primary filter element.

After six cleanings, the primary element should be replaced. Replace the element annually.

i01260415

Engine Air Filter Primary Element - Replace

SMCS Code: 1054-510-PY

Regardless of the condition, replace the engine air filter primary element at an interval of one year.

⚠ WARNING

Always service the air cleaner from the right fender only. DO NOT stand on the undercarriage, belt, or ground to service the air cleaner. Personal injury could result.

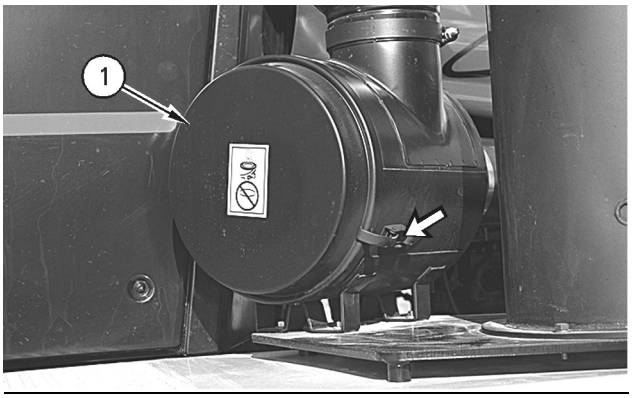


Illustration 281 g00411498

1. Slowly release the latches for the air cleaner housing. Remove cover (1).

Note: The latches for the air cleaner housing may snap open when you release the latches.

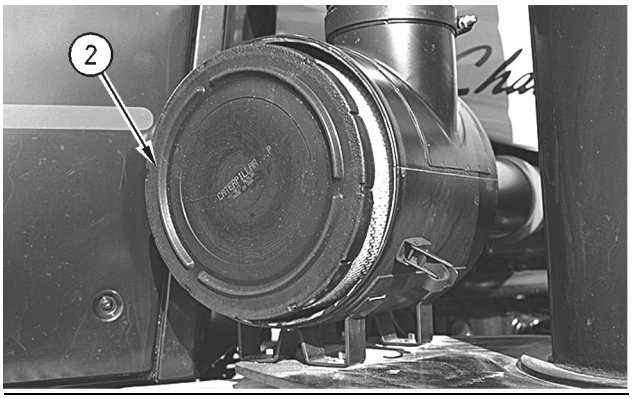


Illustration 282 g00411499

2. Remove primary filter element (2) from the air cleaner housing. In order to remove the engine air filter primary element, pull the element outward. While you pull the element outward, rock the element.

3. Install a clean primary filter element over the engine air filter secondary element. Apply firm pressure to the end of the primary element as you gently rock the filter element. This seats the primary element.

4. Clean the cover for the air cleaner housing. Align the slot on the cover with the pin on the air cleaner housing. Install the cover.

i00831582

Engine Air Filter Secondary Element - Replace

SMCS Code: 1051; 1054-510-SE

NOTICE
Always replace the secondary element. Do not attempt to reuse it by cleaning. Engine damage could result.

Note: Replace the engine air filter secondary element when you service the engine air filter primary element for the third time. Replace the secondary filter element if the exhaust smoke remains black and a clean primary filter element has been installed. Also, replace the secondary filter element whenever the secondary filter element appears dirty or the secondary filter element appears dusty.

⚠ WARNING

Always service the air cleaner from the right fender only. DO NOT stand on the undercarriage, belt, or ground to service the air cleaner. Personal injury could result.

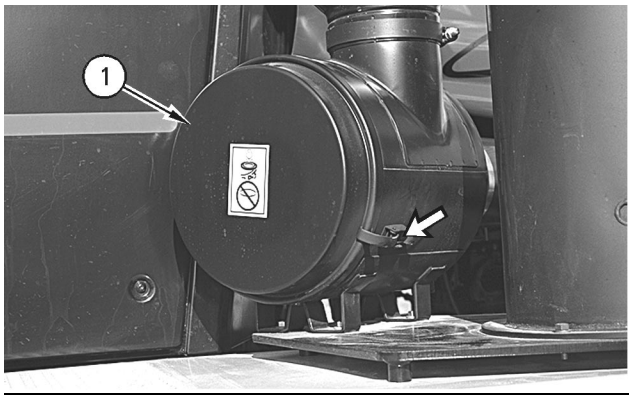


Illustration 283 g00401405

1. Slowly release latches for the air cleaner housing. Remove cover (1).

Note: The latches for the air cleaner housing may snap open when you release the latches.

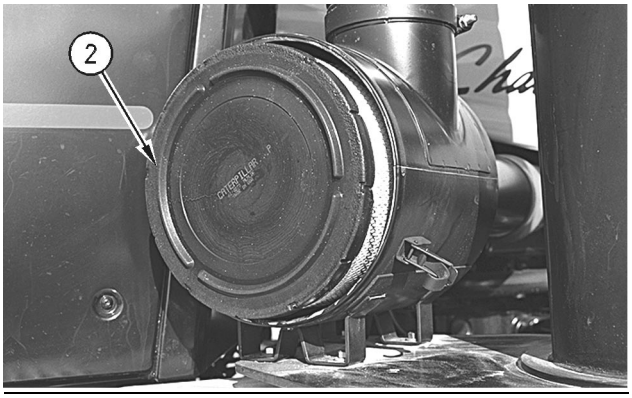


Illustration 284 g00401441

2. Remove primary filter element (2) from the air cleaner housing. In order to remove the primary filter element, pull the primary filter element outward. While you pull the primary filter element outward, rock the primary filter element.

Note: See Operation and Maintenance Manual, “Engine Air Filter Primary Element - Clean”.

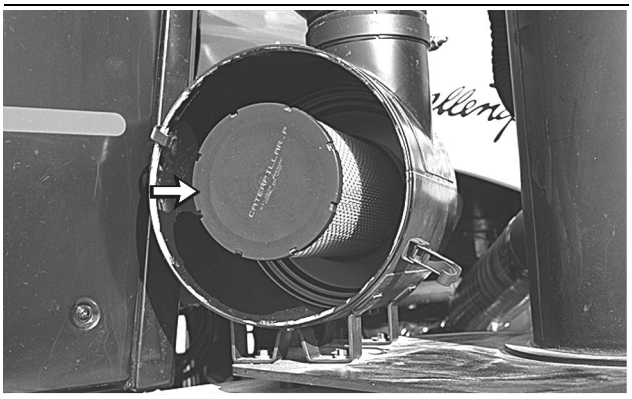


Illustration 285 g00403878

3. Remove the secondary element .

4. Cover the air inlet opening. Clean the inside of the air cleaner housing.

5. Inspect the gasket between the air inlet and the housing. If the gasket is damaged, replace the gasket.

6. Uncover the air inlet opening. Install a new secondary filter element. Apply firm pressure to the end of the secondary filter element as you gently rock the secondary filter element. This seats the secondary filter element.

7. Install the primary filter element. Apply firm pressure to the end of the primary filter element as you gently rock the primary filter element. This seats the primary filter element.

8. Clean the cover for the air cleaner housing. Align the slot on the cover with the pin on the air cleaner housing. Install the cover.

9. Reset the air cleaner service indicator.

i01191101

Engine Compartment Hood - Raise/Lower

SMCS Code: 7251-009

⚠ WARNING

Weak or inoperative hood lift-assist struts could cause the hood to lower unexpectedly, possibly causing personal injury. To prevent unexpected hood lowering, always engage the hood support latch as soon as the hood is in the full-raised position.

Raise the Hood

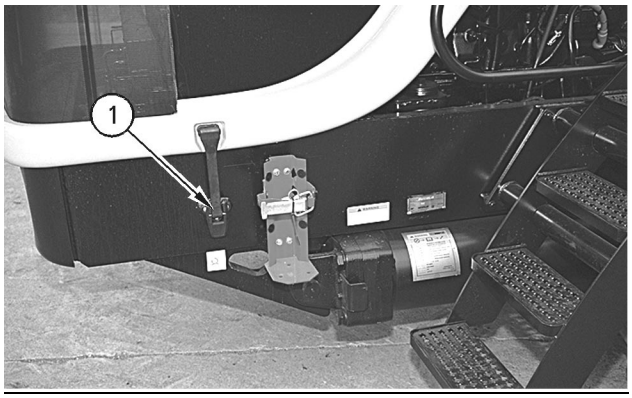


Illustration 286 g00405328

1. Pull out on rubber latch (1). This will release the rubber latch. Release the rubber latches on each side of the machine.

2. Raise the hood by a short distance. Then, a gas strut raises the hood to the RAISED position.

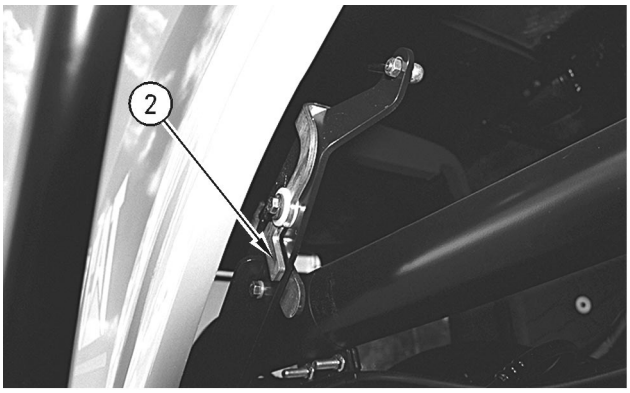


Illustration 287 g00405419

Latch (2) for supporting the hood is located on the left side of the machine.

3. Rotate latch (2) for supporting the hood counterclockwise in order to release latch (2).

Lower the Hood

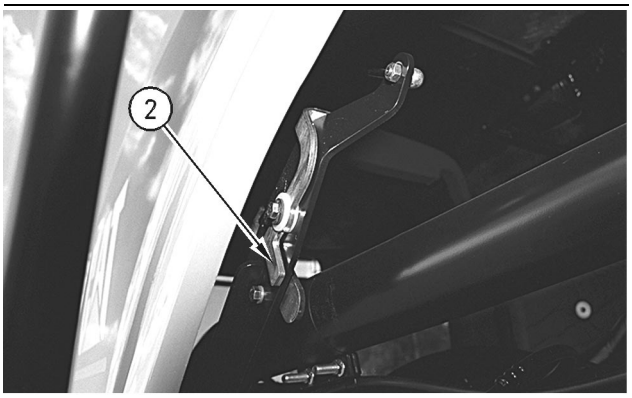


Illustration 288 g00405419

Latch (2) for supporting the hood is located on the left side of the machine.

1. Rotate latch (2) for supporting the hood clockwise in order to release latch (2).

Note: You may need to slightly move the hood in order to lower the hood.

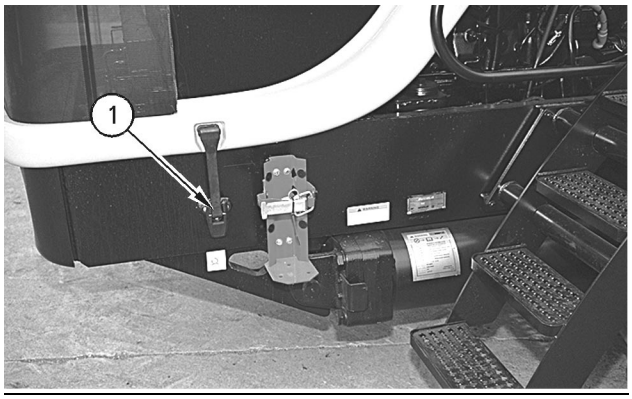


Illustration 289 g00405328

2. Pull the hood downward. Hook rubber latches (1) over the hooks on the side of the hood. Press downward on the bottom portion of the rubber latch. Engage rubber latches (1) on both sides of the machine.

Note: You will hear a click when rubber latches (1) are engaged.

i00836354

Engine Crankcase Breather - Clean

SMCS Code: 1317-070

NOTICE
If the crankcase breather is not maintained on a regular basis, it can become plugged. A plugged breather will cause excessive crankcase pressure that may cause crankshaft seal leakage.

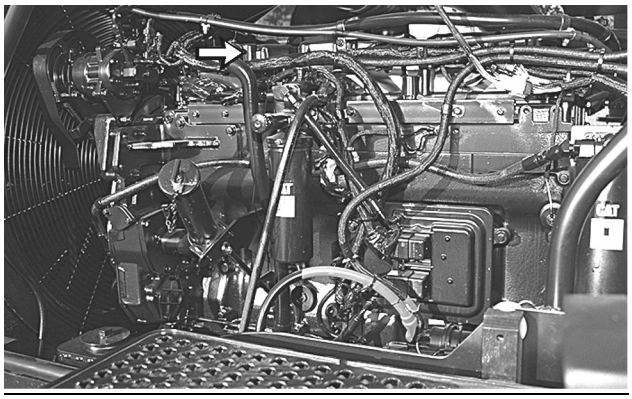


Illustration 290 g00407758

The crankcase breather is located on the left side of the engine. Use the following procedure in order to clean the crankcase breather.

1. Raise the hood. See Operation and Maintenance Manual, “Engine Compartment Hood - Raise/Lower”.

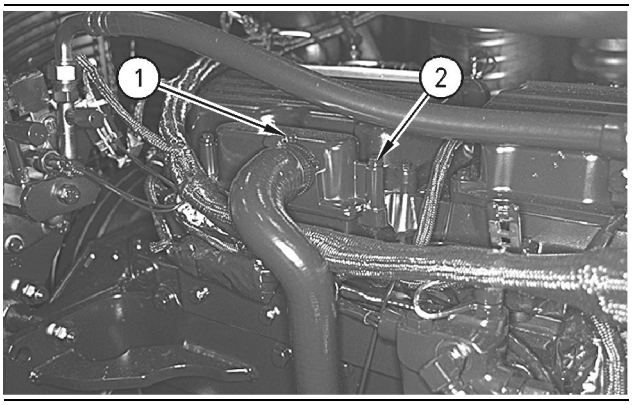


Illustration 291 g00407759

2. Loosen breather outlet hose clamp (1). Remove the hose from the engine crankcase breather.

3. Remove three bolts (2).

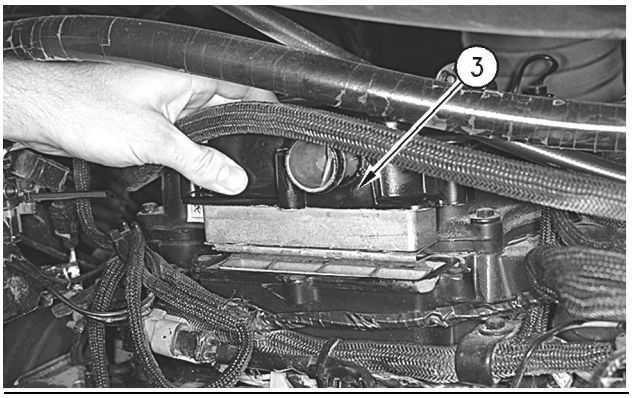


Illustration 292 g00407760

4. Remove breather assembly (3).

5. Wash the breather in a clean, nonflammable solvent. Allow the breather to dry.

6. Install a clean, dry breather assembly (3).

7. Install bolts (2).

8. Inspect the hoses for damage. If necessary, replace the hoses.

9. Install the hoses and tighten clamp (1). See Operation and Maintenance Manual, “Standard Torque for Worm Drive Band Hose Clamps”.

i01183617

Engine Oil and Filter - Change

SMCS Code: 1308; 1318-510

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE
Do not under fill or overfill engine crankcase with oil. Either condition can cause engine damage.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Park the machine on a hard, level surface. Stop the engine. Allow the oil to cool for five minutes.

Note: The engine oil should be warm when you change the engine oil.

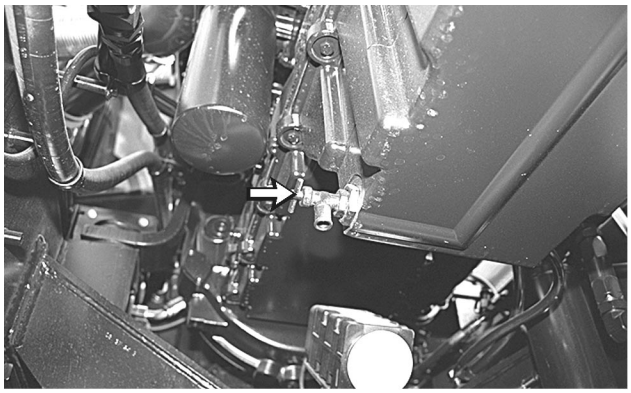


Illustration 293 g00409708

2. The engine is equipped with an ecology drain valve. Attach a hose to the nipple on the drain valve. The hose prevents the oil from splashing.

3. Turn the handle counterclockwise in order to drain the engine oil. Drain the engine oil into a suitable container.

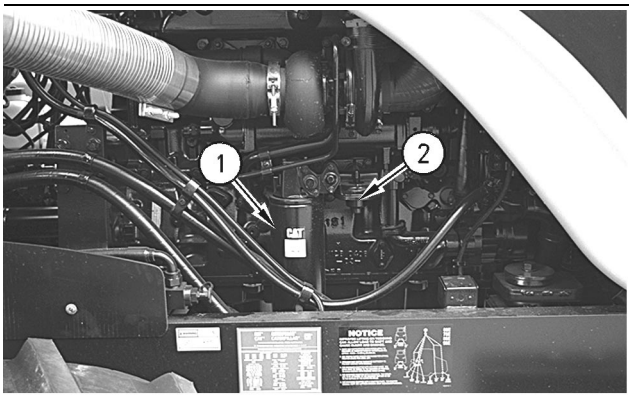


Illustration 294 g00409709

4. Use a 2P-8250 Strap Wrench Assembly in order to remove oil filter (1).

Note: An additional oil filter can be installed on filter base (2). Consult any Caterpillar dealer for more information.

5. Inspect the engine oil filter. See Operation and Maintenance Manual, “Oil Filter - Inspect”.

Illustration 295 g00409710

6. Wipe the sealing surface of the mounting base. Make sure that you remove all of the oil filter seal.

Illustration 296 g00409711

7. Apply a thin coat of clean engine oil to the new oil filter seals. Install the new oil filter by hand. When the filter seal contacts the filter base, tighten the filter elements by an additional turn of 270 degrees. Rotation index marks are spaced at 90 degree intervals. Use these rotation index marks as a guide for proper tightening.

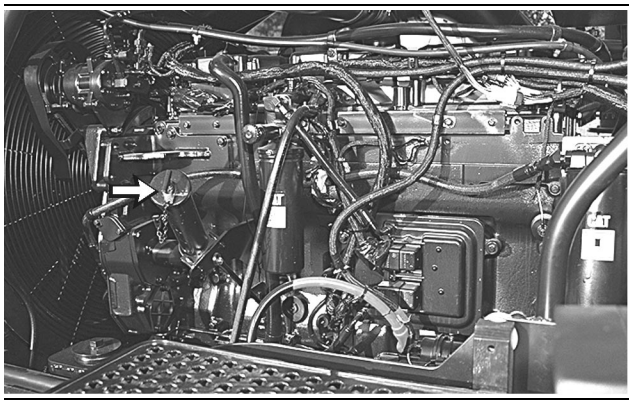


Illustration 297 g00409712

8. Remove the oil filler cap. Add the correct type of engine oil. Add engine oil. See Operation and Maintenance Manual, “Lubricant Viscosities”.

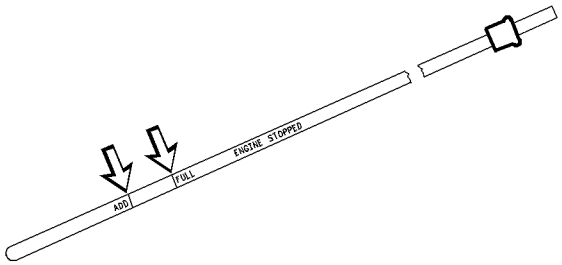


Illustration 298 g00409706

9. Before you start the engine, make sure that the oil level is between the “ADD” mark and the “FULL” mark on the “ENGINE STOPPED” side of the dipstick.

NOTICE
In order to prevent crankshaft or bearing damage, crank the engine to fill all of the filter element before you start the engine.

10. Start the engine. Run the engine at low idle speed for five minutes in order to check for leaks. Stop the engine.

11. After five minutes, check the oil level. Maintain the engine oil level between the “ADD” mark and the “FULL” mark on the “ENGINE STOPPED” side of the dipstick.

i01183623

Engine Oil Level - Check

SMCS Code: 1302; 1308; 1326-535-FLV

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE
Do not under fill or overfill engine crankcase with oil. Either condition can cause engine damage.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Park the machine on a hard, level surface. Stop the engine before you check the engine oil level. Allow the oil to cool for five minutes.

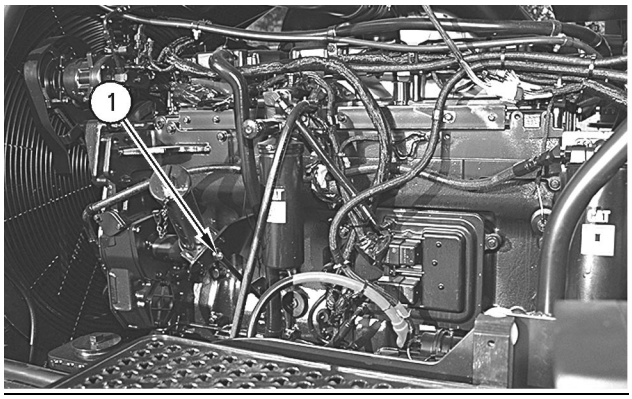


Illustration 299 g00409705

2. Check dipstick (1) while the engine is stopped.

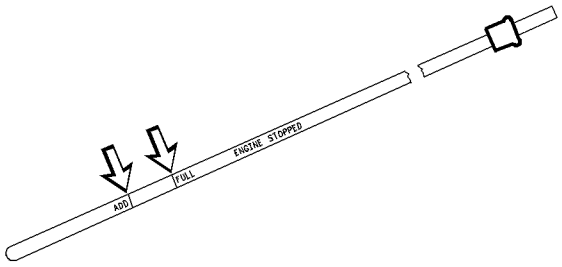


Illustration 300 g00409706

3. Maintain the engine oil level between the “ADD” mark and the “FULL” mark on the “ENGINE STOPPED” side of the dipstick.

Note: When you operate the machine on severe slopes, the oil level in the engine crankcase must be at the “FULL” mark on the “ENGINE STOPPED” side of the dipstick.

4. If the engine oil level is low, add engine oil.

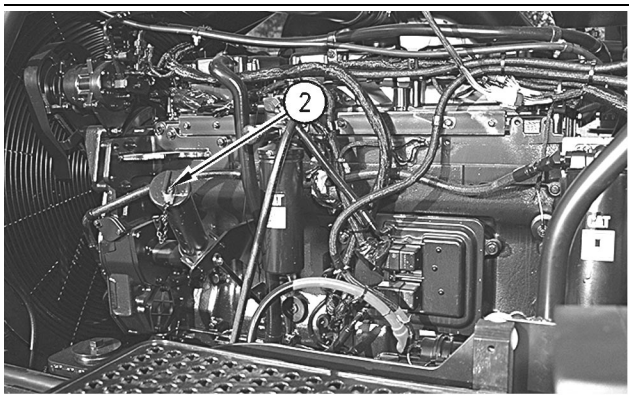


Illustration 301 g00409707

a. Raise the hood in order to access oil filler cap (2).

Note: See Operation and Maintenance Manual, “Engine Compartment Hood - Raise/Lower”.

b. Remove oil filler cap (2).

c. Add the correct type of engine oil. Add engine oil until the engine oil level is between the “ADD” mark and the “FULL” mark on the dipstick.

Note: See Operation and Maintenance Manual, “Lubricant Viscosities” for the correct type of engine oil.

d. Clean oil filler cap (2) and install oil filler cap (2).

e. Close the hood.

f. Start the engine. Run the engine at low idle for five minutes. Check for leaks. Stop the engine. After five minutes, check the engine oil level on dipstick (1). Maintain the engine oil level between the “ADD” mark and the “FULL” mark.

i00838553

Engine Oil Sample - Obtain

SMCS Code: 1000-008; 7542-008

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

Obtain the sample of the engine oil as close as possible to the recommended sampling interval. The recommended sampling interval is every 250 service hours. In order to receive the full effect of S·O·S oil analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent oil samplings that are evenly spaced.

1. Before you obtain an S·O·S oil sample, operate the machine until the oil is warm and the oil is well circulated. Then obtain the S·O·S oil sample.

NOTICE

Do not use the same vacuum sampling pump for extracting oil samples that is used for extracting coolant samples.

A small residue of either type sample may remain in the pump and may cause a false positive analysis for the sample being taken.

Always use a designated pump for oil sampling and a designated pump for coolant sampling.

Failure to do so may cause a false analysis which could lead to customer and dealer concerns.

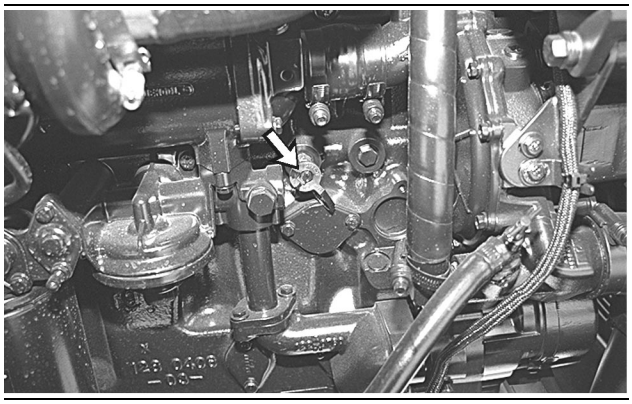


Illustration 302 g00409704

The sampling valve for the engine is located on the right side of the engine.

2. Use a sampling gun in order to obtain the oil sample from the sampling valve. Do not take the oil sample from the drain stream, because a stream of dirty oil from the bottom of the compartment will contaminate the sample. Likewise, never dip an oil sample from an oil container or pour a sample from a used filter.

Consult any Caterpillar Dealer for complete information and assistance about the S·O·S oil analysis program.

i01472340

Engine Valve Lash - Check

SMCS Code: 1102; 1209-535

Consult any Caterpillar dealer in order to adjust the engine valve lash setting. Caterpillar dealers have the tools and the trained personnel for this service.

The initial valve lash check can be performed with any of the other maintenance interval items between 250 and 1000 hours.

i00837840

Ether Starting Aid Cylinder - Replace

SMCS Code: 1456-510-CD

Illustration 303 g00409282

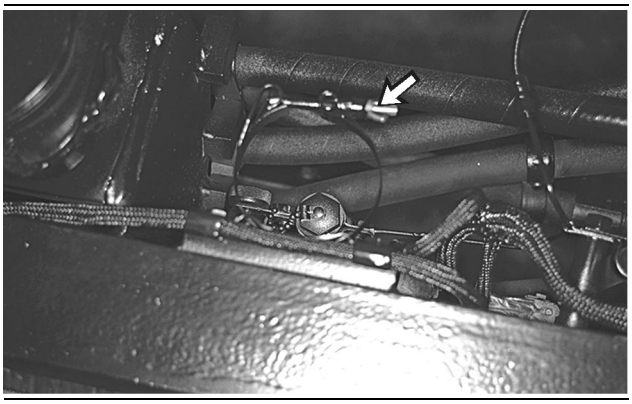


Illustration 304 g00409283

The cylinder retaining clamp is located in the front, left of the engine compartment.

1. Raise the hood.

2. Loosen the cylinder retaining clamp. Unscrew the empty ether cylinder. Remove the empty ether cylinder.

NOTICE
When removing the ether cylinder, you may need to hold the ether valve mechanism in order to prevent the mechanism from turning. The ether line and tube may be damaged if they are allowed to turn.

3. Remove the used gasket. Install the new gasket that is provided with each new cylinder.

4. Install the new cylinder. Tighten the cylinder hand tight. Tighten the cylinder clamp securely.

5. Lower the hood.

i00838915

Fire Extinguisher - Inspect

SMCS Code: 7419-040

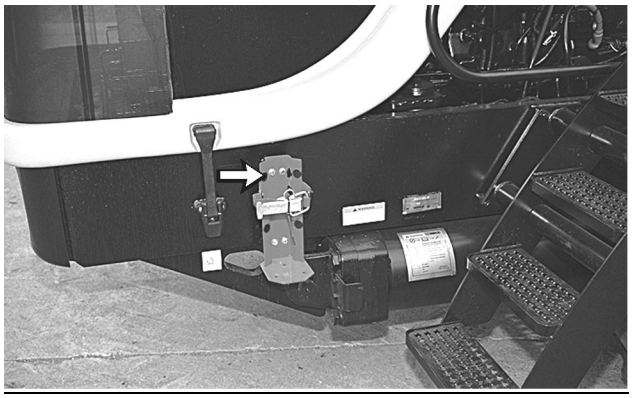


Illustration 305 g00410340

A bracket for the fire extinguisher is mounted on the left side of the machine in front of the stairs. Make sure that the fire extinguisher is charged and undamaged. If necessary, recharge or replace the fire extinguisher.

i01191116

Front Axle - Lubricate

SMCS Code: 3259; 3268; 3282-086

NOTICE
Do not use pneumatic or otherwise powered lubrication equipment.

This causes damage to the seals. Use a manual grease gun only.

Note: Lubricate the front axle with Caterpillar Multipurpose Molybdenum Grease (MPGM). See Operation and Maintenance Manual, “Lubricating Greases”.

Illustration 306 g00403833

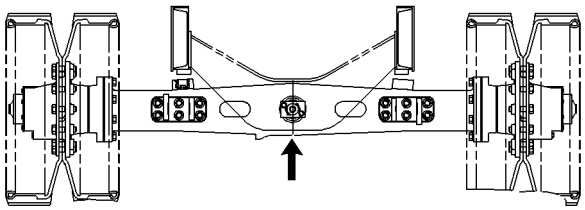


Illustration 307 g00403861

Lubricate the fitting that is located at the bottom of the center of the front axle housing.

i01191148

Front Idler Hubs Oil - Change

SMCS Code: 4159-510-HU

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

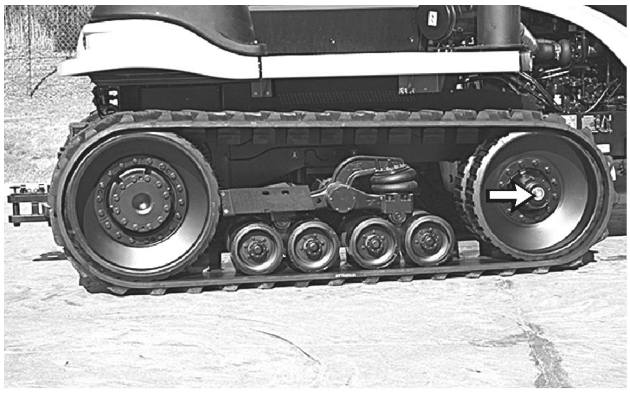


Illustration 308 g00408680

Perform this procedure on the left side and the right side idler hubs after recently using the machine.

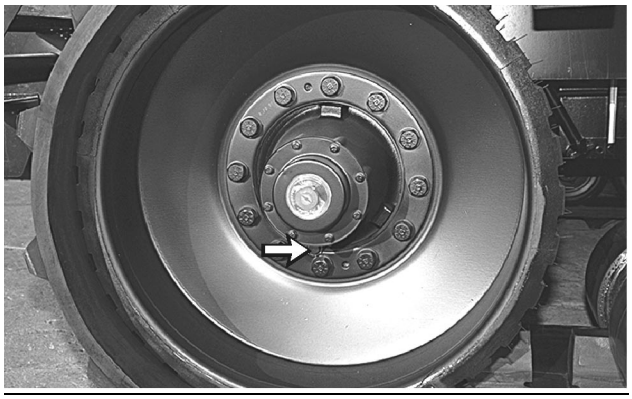


Illustration 309 g00408682

1. Park the machine so that the drain is located at the bottom of the hub.

2. Remove the magnetic drain plug.

3. Inspect the magnetic plug for signs of excessive wear. Some metal filings are usually present. Any large pieces or excessive metal filings indicate imminent bearing failure. If large pieces are found, the hub should be disassembled and inspected. Consult any Caterpillar dealer for more information.

4. Clean the drain plug.

5. Install the drain plug.

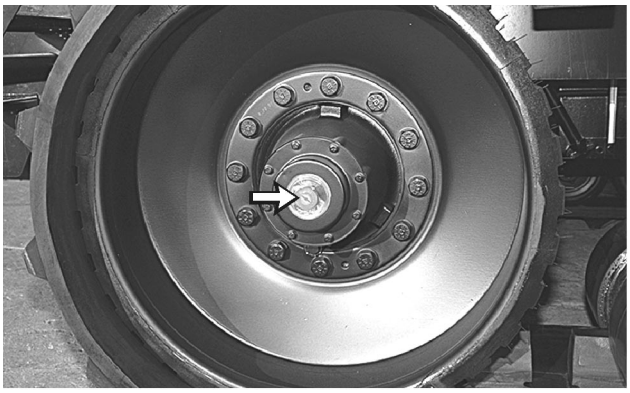


Illustration 310 g00408683

6. Remove the hub's center plug. Add the necessary amount of oil and replace the plug.

   See Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Refill Capacities" for proper oil quantities.

Note: There is a vent hole in the center of the plug. A small amount of dust that collects around the vent is normal. This is not a sign of abnormal leakage.

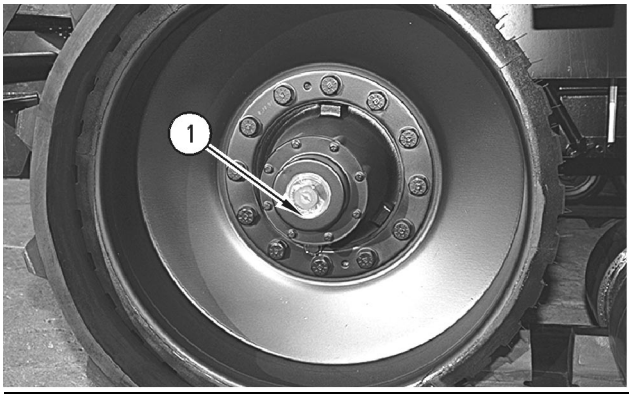


Illustration 311 g00408684

7. Maintain the oil level so that the oil touches line (1) in the sight glass in the center of the idler.

8. Check the oil level after ten minutes. If necessary, add oil. Repeat until the oil level is maintained.

i01191200

Front Idler Hubs Oil Level - Check

SMCS Code: 4159-535-HU

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

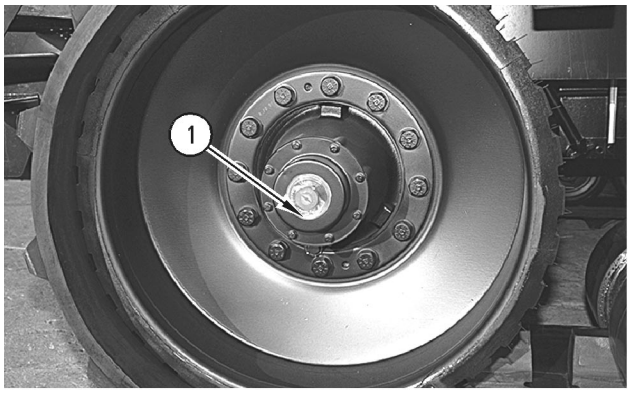


Illustration 312 g00409043

Maintain the oil level so that the oil touches line (1) in the sight glass in the center of the idler.

Note: Check the oil level for the idler hub on both sides of the machine.

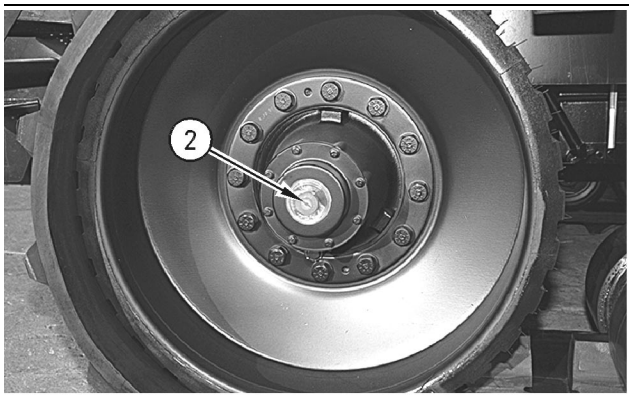


Illustration 313 g00409053

If the oil level is low, remove hub’s center plug (2). Add the necessary amount of oil and replace the plug.

Note: There is a vent hole in the center of plug (2). A small amount of dust that collects around the vent is normal. This is not a sign of abnormal leakage.

See Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Refill Capacities” for proper oil quantities.

i01191225

Fuel System - Fill

SMCS Code: 1250-544

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Illustration 314 g00637419

This machine is equipped with two filler tubes for the fuel tank. One filler tube is located on each side of the machine. See Operation and Maintenance Manual, “Refill Capacities”.

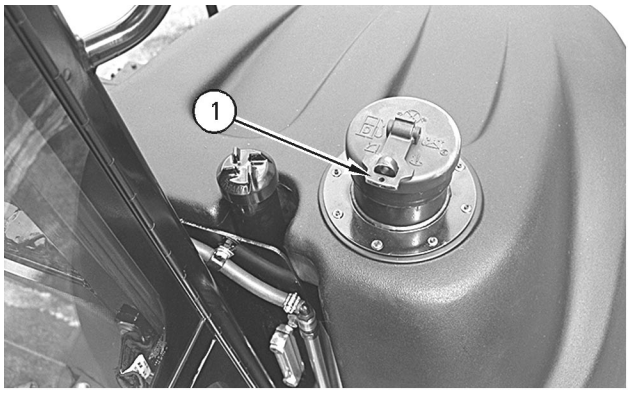


Illustration 315 g00406645

1. In order to remove the filler cap, lift tab (1).

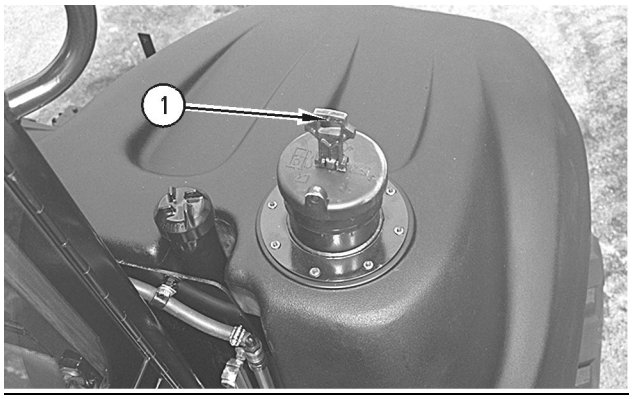


Illustration 316 g00406646

2. Rotate tab (1) in the clockwise direction to the stop. The filler cap can now be removed.

Note: Filling the fuel tank too fast may cause only one side of the fuel tank to fill. Allow enough time for the fuel level to equalize before you add more fuel.

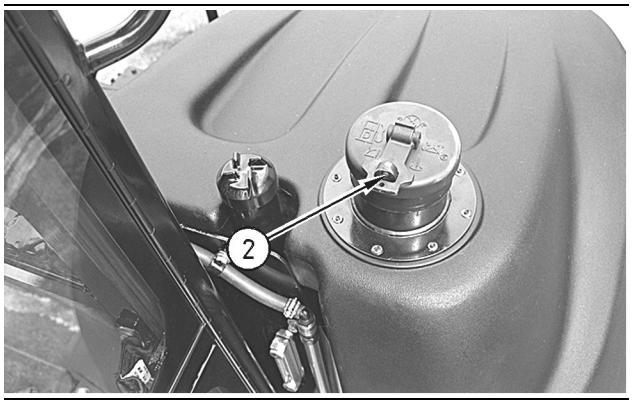


Illustration 317 g00406647

A 5P-8501 Padlock can be used in hole (2) in order to prevent unauthorized access to the fuel tank.

Note: A 9P-7121 Fuel Tank Strainer is available for the filler tube. Consult any Caterpillar dealer.

Filling the Fuel System After the Engine Runs Dry of Fuel

1. Fill the fuel tank with fuel.

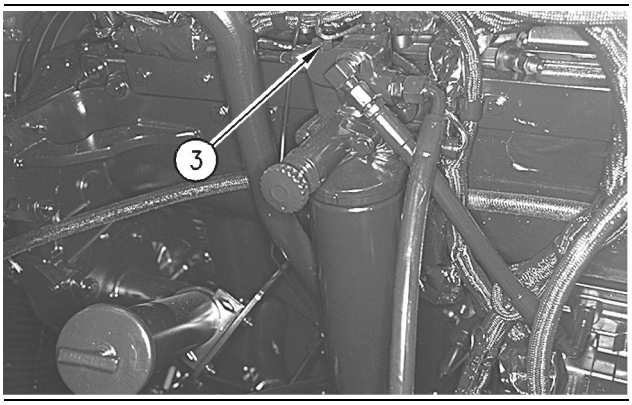


Illustration 318 g00406648

2. Locate air purge plug (3) on the secondary fuel filter base. Loosen the plug by two full turns.

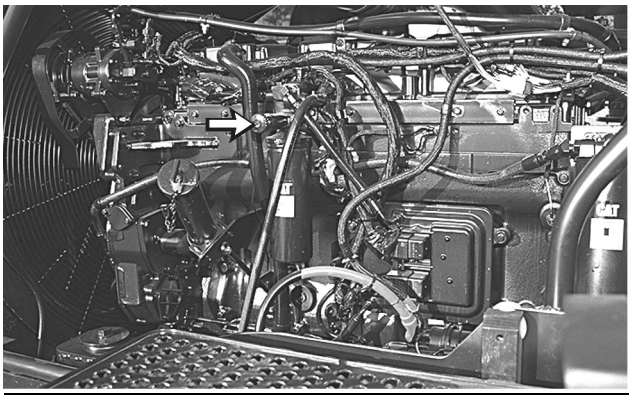


Illustration 319 g00406649

3. Unlock the hand priming pump. Operate the hand priming pump until fuel appears at the “air bleed” plug. A considerable number of strokes may be required in order to fill the fuel lines and the fuel filters.

4. Tighten “air bleed” plug (3). Continue to operate the priming pump until you feel a strong resistance. Listen for an audible click from the fuel filter base. The click indicates that the valve is opened and the system is pressurized. Lock the handle on the hand priming pump.

5. Crank the engine. If the engine starts but the engine runs rough, operate the engine at low idle speed until the engine runs smoothly.

i01183747

Fuel System Primary Filter/Water Separator - Clean/Replace

SMCS Code: 1260-070-PY; 1260-510-PY; 1261

WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

WARNING

Personal injury can result when using cleaner solvents.

To help prevent personal injury, follow the instructions and warnings on the cleaner solvent container before using.

WARNING

Personal injury or death can result from a fire.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

NOTICE
Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

The primary filter/water separator extends the life of the secondary fuel filter. The primary filter/water separator also removes water from the fuel.

In normal conditions, replace the fuel filter elements after every 250 service hours. Severe conditions that cause dirt, rust, or other contamination may shorten the life of the filters.

NOTICE
Fuel system damage may result if engine power loss is used to indicate when fuel filters need to be replaced.

A fuel pressure sensor will indicate low fuel pressure when either filter is plugged. The engine status lamp will flash a code 63. See Operation and Maintenance Manual, “Engine Status Lamp”.

If a code 63 occurs, replace both fuel filters before you begin the next day’s work. If the filter plugs early, check your fuel supply for contaminants.

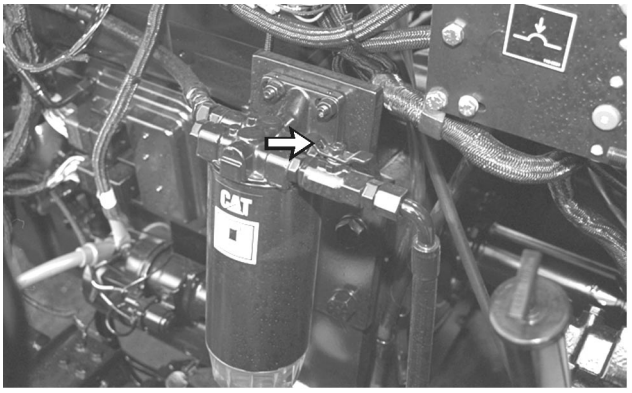


Illustration 320 g00407223

1. Shut off the fuel at the primary filter with the shutoff valve.

NOTICE
Protect the rubber engine mounts from fuel spillage. Contact with fuel will damage the rubber engine mounts.

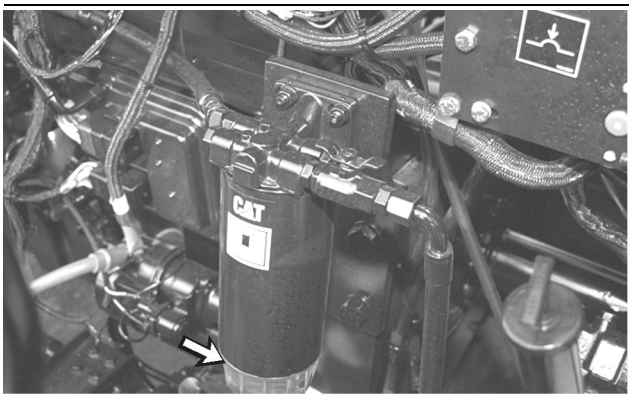


Illustration 321 g00407259

2. Drain the primary filter. Unscrew the water separator bowl in order to remove the water separator bowl from the primary filter element.

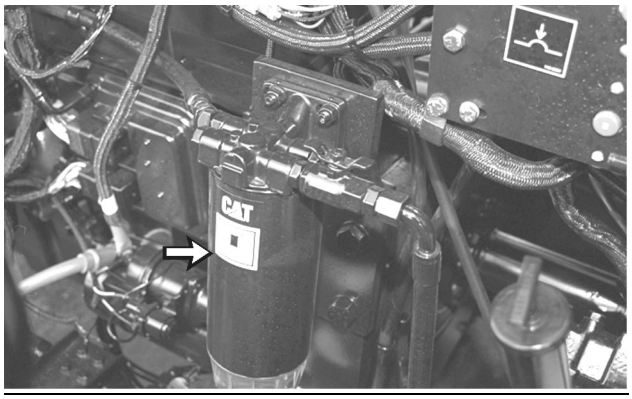


Illustration 322 g00407261

3. Remove the element by hand. Also, you can use a strap wrench in order to remove the element.

4. Drain the filter element and dispose of the fuel.

5. Clean the water separator bowl. Install the clean water separator bowl onto a new primary filter.

Note: The water separator bowl is reusable. If it is difficult to look in the water separator bowl, replace the water separator bowl.

6. Clean the mounting surface for the filter. Apply clean diesel fuel to the new fuel filter gasket. Tighten the filter by one turn after the filter contacts the filter base.

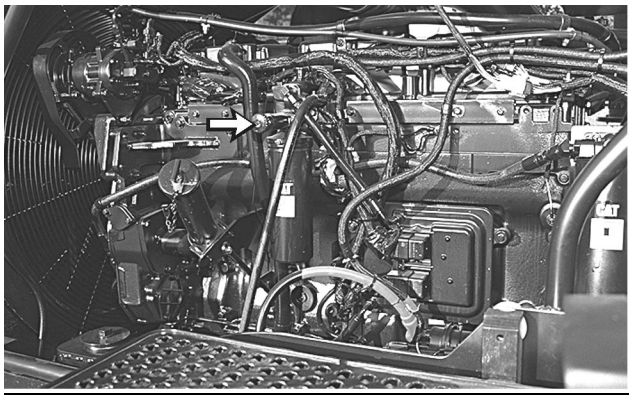


Illustration 323 g00406649

7. Open the fuel valve in order to turn on the fuel. Operate the hand priming pump in order to fill the primary filter/water separator.

8. Start the engine. Run the engine at 1000 rpm to 1200 rpm until the air is pumped through the engine. Some misfiring may occur. However, the engine will not be damaged.

i00836142

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510-SE

⚠ WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

⚠ WARNING

Personal injury can result when using cleaner solvents.

To help prevent personal injury, follow the instructions and warnings on the cleaner solvent container before using.

⚠ WARNING

Personal injury or death can result from a fire.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

NOTICE
Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

In normal conditions, replace the fuel filter elements after every 250 service hours. Severe conditions that cause dirt, rust, or other contamination may shorten the life of the filters.

NOTICE
Fuel system damage may result if engine power loss is used to indicate when fuel filters need to be replaced.

A fuel pressure sensor will indicate low fuel pressure when either filter is plugged. The engine status lamp will flash a code 63. See Operation and Maintenance Manual, “Engine Status Lamp”.

If a code 63 occurs, replace both fuel filters before you begin the next day’s work. If the filter plugs early, check your fuel supply for contaminants.

NOTICE
When replacing the secondary fuel filter, use only the 1R-0762 Fuel Filter Assembly or equivalent. Use of any other Caterpillar filter or a filter from another manufacturer can result in fuel injector damage due to accelerated wear of close toleranced fuel system parts.

The secondary fuel filter is a highly efficient filter. It is important to use a highly efficient filter due to the high injection pressures that are used in the fuel system.

⚠ WARNING

Pressure may remain in the secondary fuel filter after the engine is shutdown.

Wait at least five minutes for residual pressure to subside before you remove the secondary fuel filter.

Failure to wait for the pressure to subside can result in personal injury.

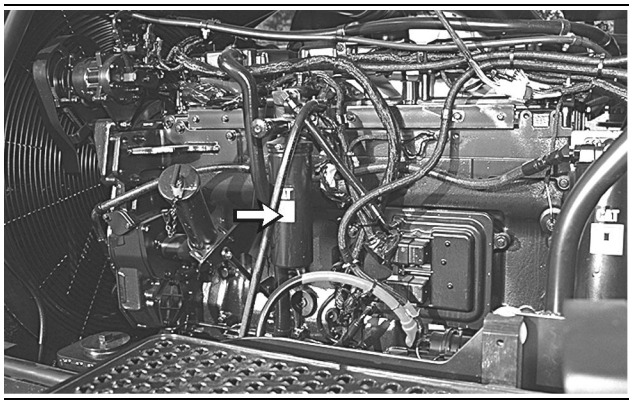


Illustration 324 g00407538

1. Remove the secondary fuel filter element.
2. Drain the filter element and dispose of the fuel.
3. Clean the sealing surface of the filter base. Make sure that all of the former O-ring seal is removed.
4. Apply clean diesel fuel to the new fuel filter gasket. Tighten the filter by one turn after the filter contacts the filter base.

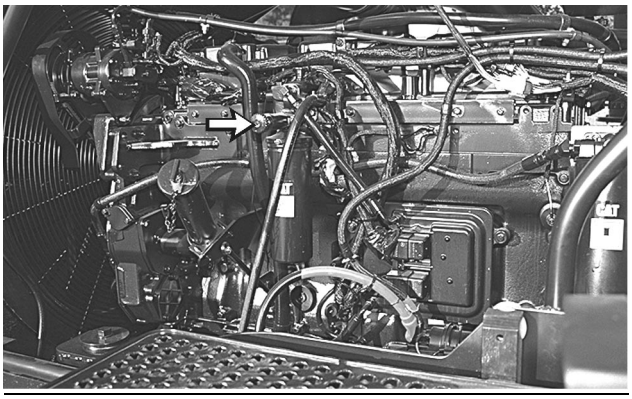


Illustration 325 g00406649

5. Operate the hand priming pump in order to fill the secondary fuel filter.
6. Start the engine. Run the engine at 1000 rpm to 1200 rpm until the air is pumped through the engine. Some misfiring may occur. However, the engine will not be damaged.

NOTICE
Do not crank the engine for more than 30 seconds. Allow the starter to cool for two minutes before cranking again. Turbocharger damage can result if the engine rpm is not kept low until the oil gauge display verifies that the oil pressure is sufficient.

7. If the engine dies, crank the engine for a maximum of 30 seconds. If the engine does not start, you may need to prime the engine for an additional 25 pumps.

i00835532

Fuel System Water Separator - Drain

SMCS Code: 1263-543

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

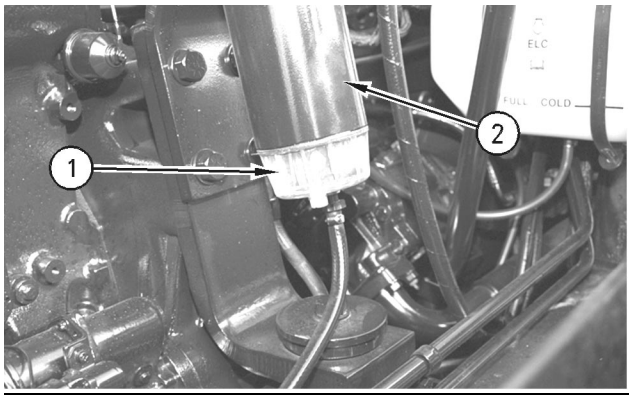


Illustration 326 g00406659

Water separator bowl (1) is located below primary filter/water separator (2). If water is present, water will be visible at the bottom of the water separator bowl.

1. Loosen the drain valve in order to drain the moisture into a suitable container. Drain the water separator bowl until all of the moisture is removed.

2. Close the drain valve. Dispose of the moisture.

i00836242

Fuel System - Prime

SMCS Code: 1258

NOTICE
Do not crank the engine for more than 30 seconds. Allow the starter to cool for two minutes before cranking again. Turbocharger damage can result if the engine rpm is not kept low until the oil gauge display verifies that the oil pressure is sufficient.

If the engine does not start, air may be trapped in the fuel lines to the engine. Use the following procedure in order to purge air from the fuel lines.

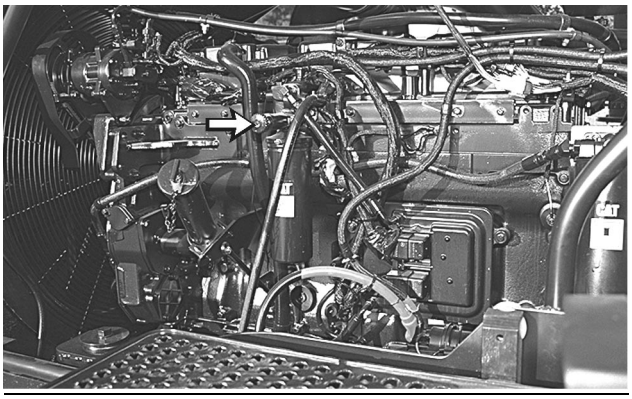


Illustration 327 g00406649

The fuel priming pump is located above the secondary fuel filter on the right side of the engine.

1. Unlock the priming pump plunger. Operate the plunger until you feel resistance.

2. Push in the plunger. Hand tighten the plunger.

3. Start the engine. If the engine does not start, you may need to prime the engine for an additional 25 pumps. Some misfiring may occur. However, the engine will not be damaged.

4. Run the engine at low idle speed until the engine runs smoothly.

i00835616

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

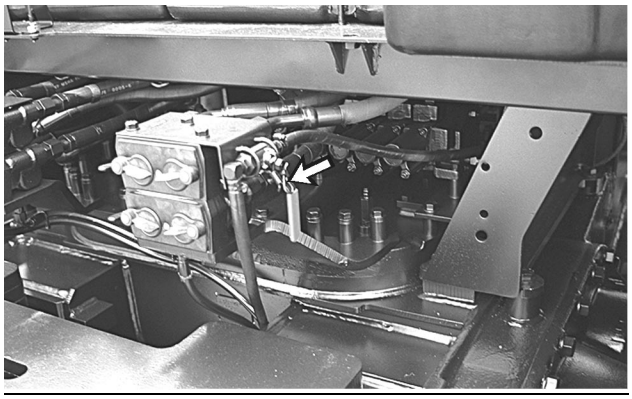


Illustration 328 g00406799

The drain for the fuel tank is mounted to the right side of the right hydraulic coupler.

1. Attach a hose to the drain valve.
2. Open the drain valve in order to allow water and sediment to drain into a suitable container.
3. Close the drain valve when clean fuel appears.

i01183104

Fuel Vent Breather - Clean

SMCS Code: 1273-070-BRE

Illustration 329 g00633546

The fuel tank breather is located on the right, rear side of the operator's compartment.

1. Remove the breather.
2. Wash the breather in a clean, nonflammable solvent.
3. Allow the breather to dry.
4. Install the clean, dry breather.

i01183271

Fuses, Circuit Breakers and Relays - Replace/Reset

SMCS Code: 1417-510

NOTICE
Always replace fuses with the same type and capacity fuse that was removed. Otherwise, electrical damage could result.

Fuses protect the electrical system from damage that is caused by overloaded electrical circuits. Replace a fuse if the element separates. If the fuse of a particular electrical system requires frequent replacement, check the electrical circuit. Repair the electrical circuit, if necessary. There are two fuse panels for the electrical system.

A decal is attached to the back of the cover of the fuse panel that is located on the right side console near the floor. The decal provides a description of the fuses and the circuit breakers that are located in both the fuse panels. The left side of the decal contains the information for the fuse panel for the dash panel. The right side of the decal contains the information for the fuse panel for the right hand console.

Fuse Panel for the Dash Panel

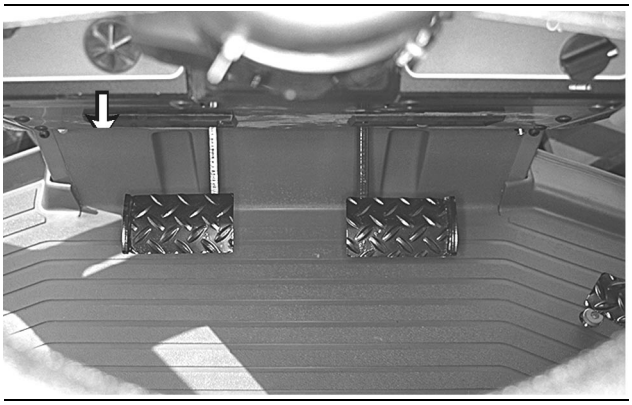


Illustration 330 g00403425

The fuse panel for the dash panel is located below the dashboard and behind the inching pedal.

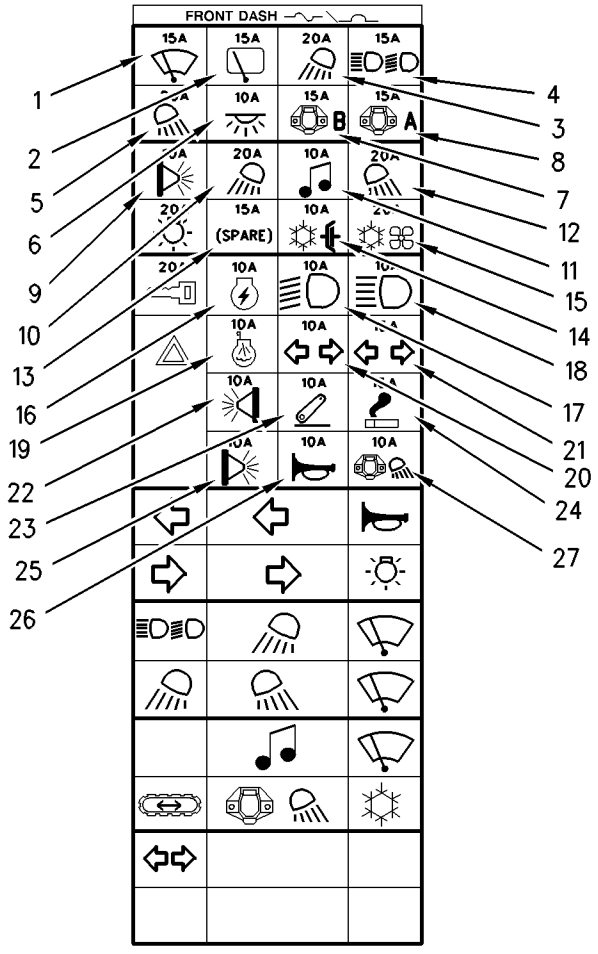


Illustration 331 g00633661

Table 47

Fuses			
Number	**Rating**	**Color**	**Description**
1	15 Amp	Blue	Front wiper
2	15 Amp	Blue	Rear wiper
3	20 Amp	Yellow	Front floodlights
4	15 Amp	Blue	Dimmer for high beam
5	20 Amp	Yellow	Rear floodlights
6	10 Amp	Red	Dome Lights
6	10 Amp	Red	Parking lights
6	10 Amp	Red	Lights for the rocker switches
6	10 Amp	Red	Lights for the right hand console
6	10 Amp	Red	Courtesy lights for the cab
7	15 Amp	Blue	Auxiliary trailer connector (pin 7)
8	15 Amp	Blue	Auxiliary trailer connector (pin 4)
9	10 Amp	Red	Stop lamp
10	20 Amp	Yellow	Partial floodlights
11	10 Amp	Red	Radio (if equipped)
12	20 Amp	Yellow	Backlighting
13	15 Amp	Blue	Spare
14	10 Amp	Red	Air conditioning clutch
15	20 Amp	Yellow	Air conditioner blower
16	10 Amp	Red	Ignition
17	10 Amp	Red	Low beam headlamps
18	10 Amp	Red	High beam headlamps
19	10 Amp	Red	Starting aid
20	10 Amp	Red	Turn signals
21	15 Amp	Blue	Turn signals for a trailer
22	10 Amp	Red	Left tail light
23	10 Amp	Red	Control for the three-point hitch
24	15 Amp	Blue	Rear power port on the right side console
25	10 Amp	Red	Right tail light
26	10 Amp	Red	Horn
27	10 Amp	Red	Work lights for trailer

Fuse Panel for the Right Side Console

Illustration 332 g00403433

The fuse panel for the right side console is located on the front of the right side console near the floor.

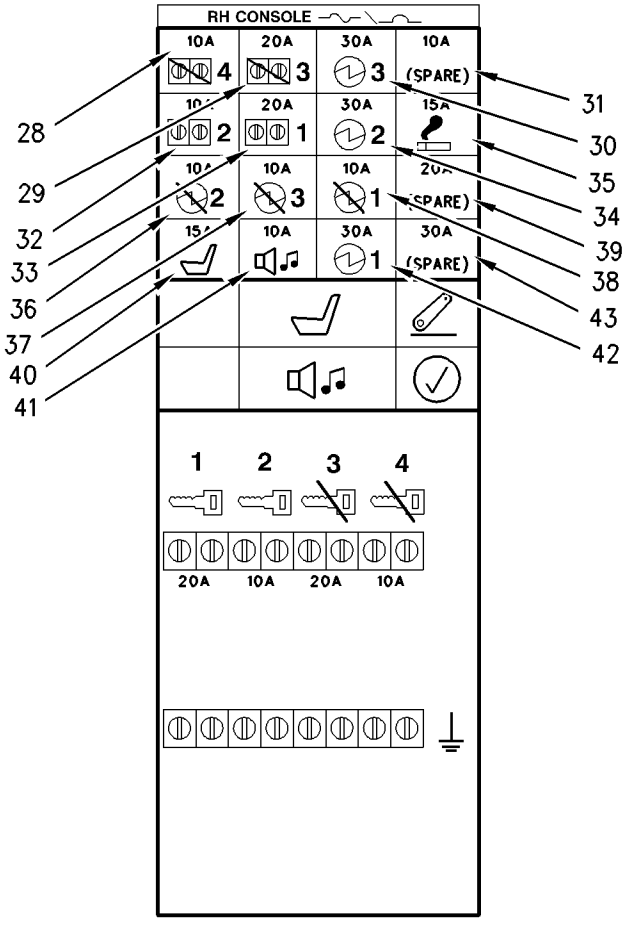


Illustration 333 g00633668

Table 48

Fuses			
Number	**Rating**	**Color**	**Description**
28	10 Amp	Red	Pair 4 of the auxiliary power terminals.(1)
29	20 Amp	Yellow	Pair 3 of the auxiliary power terminals.(1)
30	30 Amp	Green	Pin 1 from No. 3 power plug (1)
31	10 Amp	Red	Spare
32	10 Amp	Red	Pair 2 of the auxiliary power terminals.(2)
33	20 Amp	Yellow	Pair 1 of the auxiliary power terminals.(2)
34	30 Amp	Green	Pin 1 from No. 2 power plug(1)
35	15 Amp	Blue	Cigar Lighter
36	10 Amp	Red	Pin 2 from No. 2 power plug(3)
37	10 Amp	Red	Pin 2 from No. 3 power plug(3)
38	10 Amp	Red	Pin 2 from No. 1 power plug(3)
39	20 Amp	Yellow	Spare
40	15 Amp	Blue	Suspension seat
41	10 Amp	Red	Subwoofer
42	30 Amp	Green	Pin 1 from No. 1 power plug(1)
43	30 Amp	Green	Spare

(1) This pair is switched by the engine start switch key.
(2) This is switched by the engine start switch key. The pair can also be controlled with the rocker switch on the right side console.
(3) This pin has unswitched power.

Relays for the Dash Panel

The fuse panel for the dash panel is located below the dashboard and behind the inching pedal.

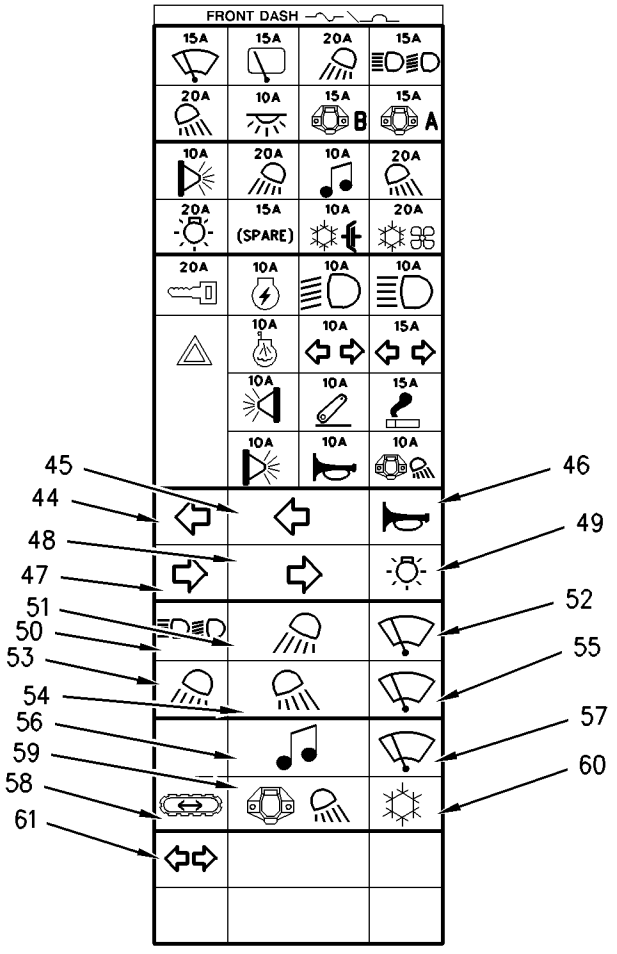


Illustration 334 g00654495

Table 49

Relays	
Number	**Description**
44	Left turn signal for the machine
45	Left turn signal for the trailer
46	Horn
47	Right turn signal for the machine
48	Right turn signal for the trailer
49	Lights for the rocker switches
50	Dimmer
51	Front flood lights
52	Front windshield wiper
53	Partial flood lights
54	Right flood lights
55	Front windshield wiper
56	Radio
57	Relay that enables the front windshield wiper
58	Switch for the belt tensioner
59	Work lights for the trailer
60	Air conditioner
61	Turn signal

Relays for the Right Side Console

The fuse panel for the right side console is located on the front of the right side console near the floor.

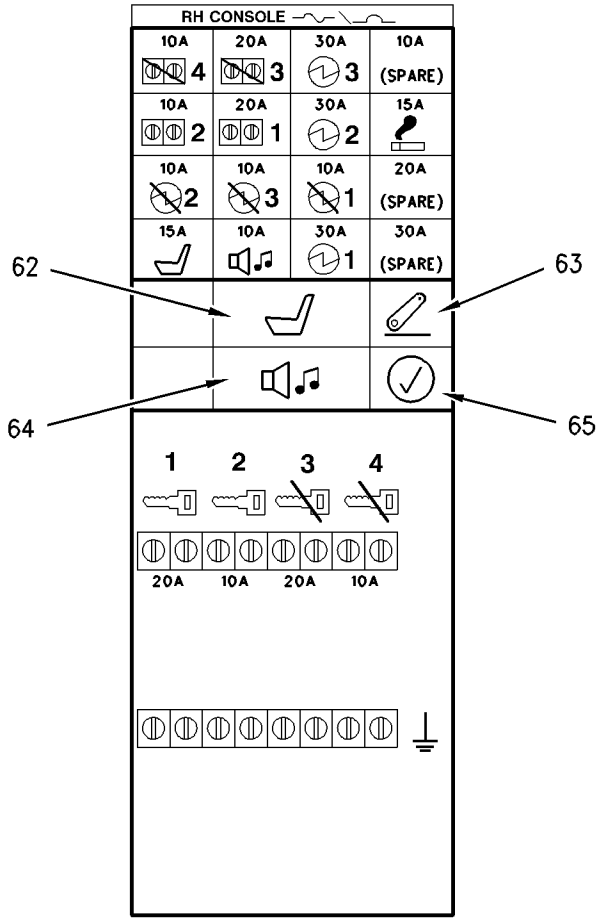


Illustration 335 g00633734

Table 50

Relays	
Number	**Description**
62	Suspension seat
63	Three-point hitch
64	Subwoofer
65	Lamp test

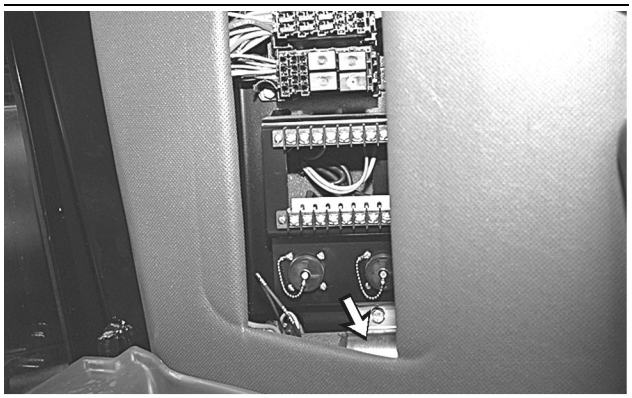


Illustration 336 g00411732

Circuit Breakers

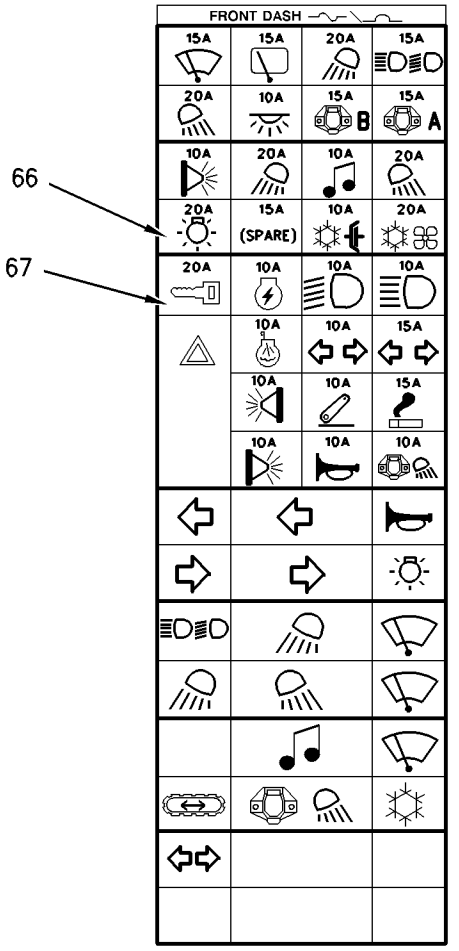


Illustration 337 g00633736

Table 51

Circuit Breakers		
Number	**Rating**	**Description**
66	15 Amp	Running lamps(1)
67	20 Amp	Engine start switch

(1) Reset the circuit breaker by turning off the lights. Then, turn on the lights. There could be an overload condition in the electrical circuit if the lights blink and/or the circuit breakers reset continuously.

Auxiliary Circuit Breakers and Main Circuit Breakers

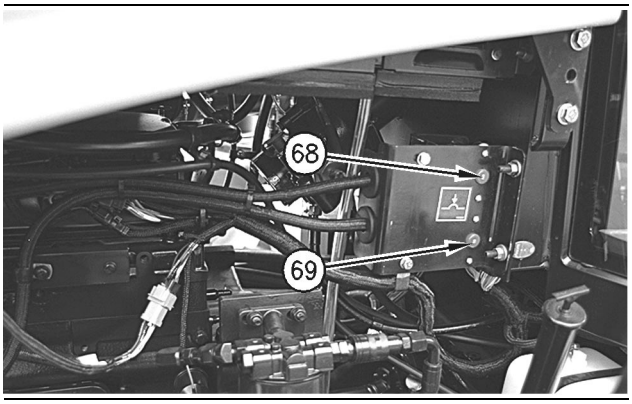


Illustration 338 g00655633

The circuit breakers are located on the air conditioner case on the left side of the machine.

Table 52

Circuit Breakers		
Number	**Rating**	**Description**
68	150 Amp	Main
69	80 Amp	Auxiliary

Circuit Breaker for the Engine and Relay for the Engine

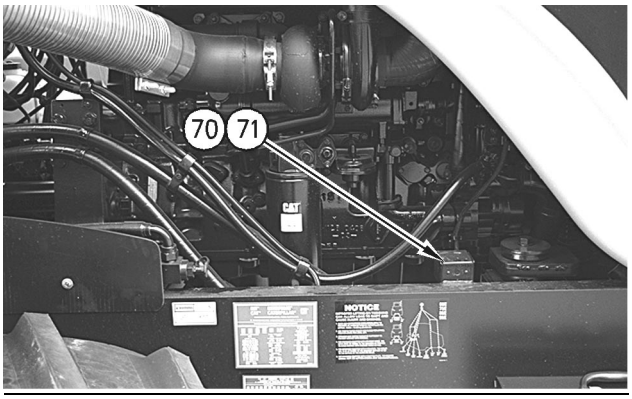


Illustration 339 g00655637

A 20 ampere circuit breaker (70) is located on the right frame rail. The circuit breaker will automatically reset after an overload condition. Relay (71) that is for the engine is located near the circuit breaker.

Table 53

Circuit Breaker and Relay		
Number	**Rating**	**Description**
70	20 Amp	Circuit breaker for engine
71		Relay for engine

i01457690

Hydraulic System Oil - Change

SMCS Code: 5050-044

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Note: If the machine is equipped with a three-point hitch, the draft arms should be lowered before you change the hydraulic oil.

1. Park the machine on a hard, level surface. Stop the engine before you check the hydraulic system oil level. Allow the oil to cool for five minutes before you check the hydraulic system.

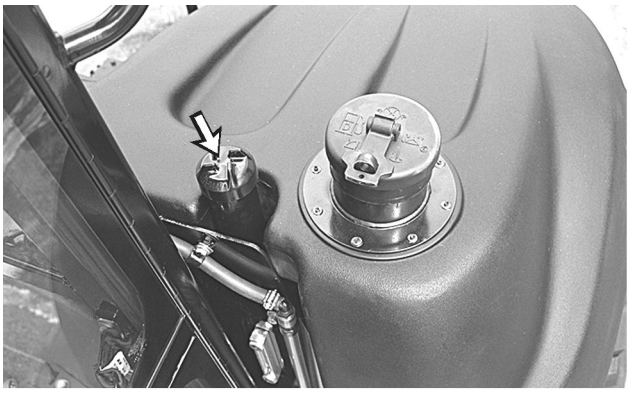


Illustration 340 g00408139

2. Slowly remove the filler cap for the hydraulic oil tank in order to relieve the pressure. The filler cap is located on top of the hydraulic tank. Access the filler cap from the left walkway.

3. Remove the filler screen. Clean the filler screen. Inspect the screen. If necessary, replace the screen.

Illustration 341 g00637436

4. Remove the drain plug.

Note: In order to drain the hydraulic oil tank, you need a straight pipe nipple. The pipe nipple should be a one inch nipple. Clamp a hose to the nipple.

5. Install the hose fitting or the nipple in the drain valve. As the nipple is inserted into the fitting, a check valve opens. The check valve allows the oil to drain into a suitable container.

6. Remove the nipple and the hose assembly.

7. Install the drain plug.

   Use Steps 8 through 11 to replace the return oil screen.

NOTICE
Make sure that you replace the return oil screen for every 1000 service hours. A plugged return oil screen or a contaminated return oil screen can damage the components of the hydraulic system.

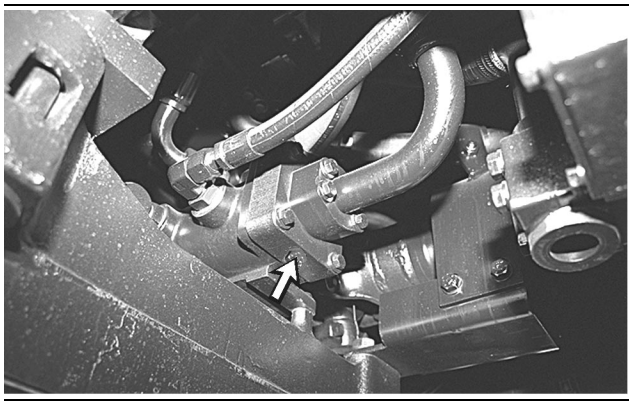


Illustration 342 g00408141

8. Remove the plug from the cover for the return screen. Allow the oil to drain into a suitable container.

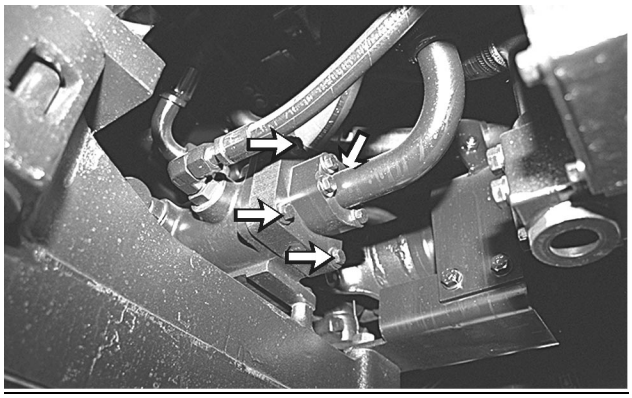


Illustration 343 g00408142

9. Loosen the four bolts on the rear of the housing for the screen. The screen is located on top of the axle. Access the screen from the bottom of the machine. Allow the oil to drain into a suitable container.

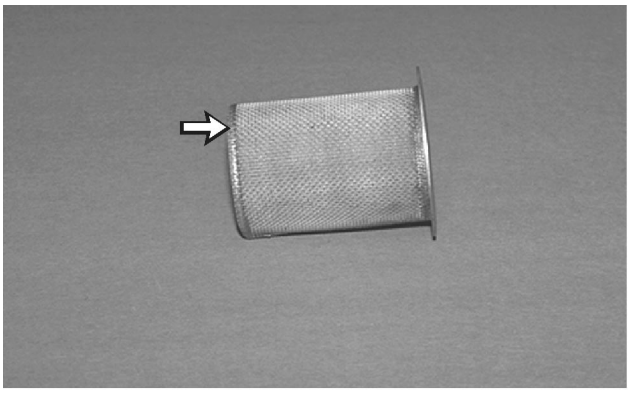


Illustration 344 g00408143

10. Remove the screen from the housing. Discard the screen.

11. Install a new screen into the housing. Make sure that the screen is seated and make sure that the seal is in the groove.

12. While the hydraulic tank is drained, change the implement return oil filter. See Operation and Maintenance Manual, “Hydraulic System Implement Return Oil Filter - Replace”.

13. Fill the hydraulic tank.

Note: See Operation and Maintenance Manual, “Lubricant Viscosities” for the correct type of hydraulic oil.

14. Inspect the gasket on the filler cap. If necessary, replace the gasket.

15. Make sure that the oil is at the “FULL” mark on the sight glass. Install the filler cap.

16. Start the engine. Run the engine for a few minutes. Inspect the machine for leaks. If necessary, refill the hydraulic oil tank.

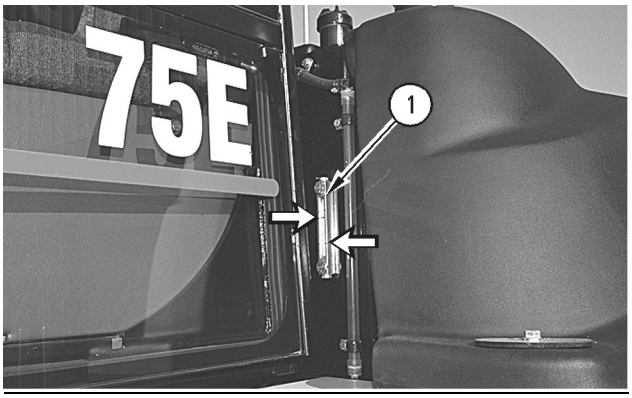


Illustration 345 g00408099

17. Maintain the oil level between the “ADD” mark and the “FULL” mark on sight glass (1).

i00836619

Hydraulic System Oil Level - Check

SMCS Code: 5056-535-FLV; 7479

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

1. Park the machine on a hard, level surface. Stop the engine before you check the hydraulic system oil level. Allow the oil to cool for five minutes before you check the hydraulic system oil level.

Note: Because of the numerous sizes of hydraulic cylinders on implements, the position of the implement can affect the hydraulic oil level. Always check the hydraulic oil with the implement in the position that the implement is normally stored.

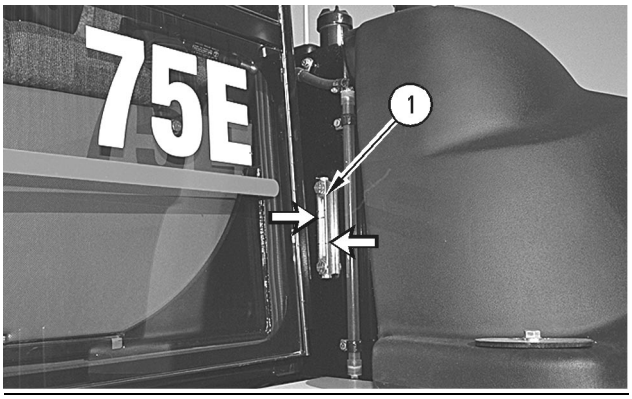


Illustration 346 g00408099

2. Sight glass (1) is located on the front of the hydraulic oil tank. The oil level should be between the “ADD” mark and the “FULL” mark on sight glass (1) .

3. If the oil level is low, add hydraulic oil.

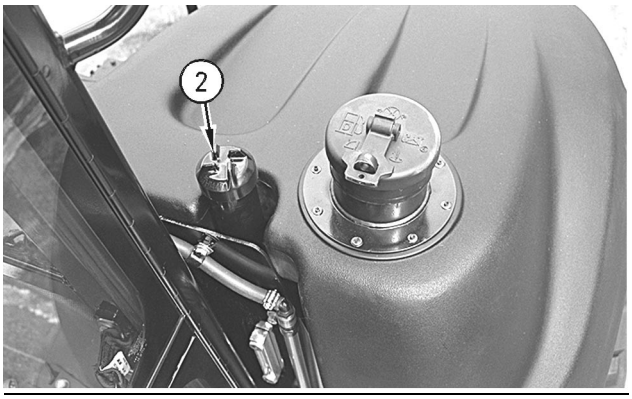


Illustration 347 g00408101

a. Remove hydraulic oil filler cap (2).

NOTICE
Do not overfill the hydraulic oil tank. Leaving all implements in their existing unhooked positions will minimize the possibility of overfilling.

b. Add the correct type of hydraulic oil. Add hydraulic oil until the hydraulic system oil level is between the “ADD” mark and the “FULL” mark on sight glass (1).

Note: See Operation and Maintenance Manual, “Lubricant Viscosities” for the correct type of hydraulic oil.

c. Clean the hydraulic oil filler cap (2). Install hydraulic oil filler cap (2).

d. Maintain the oil level between the “ADD” mark and the “FULL” mark on sight glass (1).

i00837288

Hydraulic System Oil Return Filter - Replace

SMCS Code: 5068-510

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

Note: The hydraulic oil tank must be drained in order to change the implement return oil filter. See Operation and Maintenance Manual, “Hydraulic System Oil - Change”.

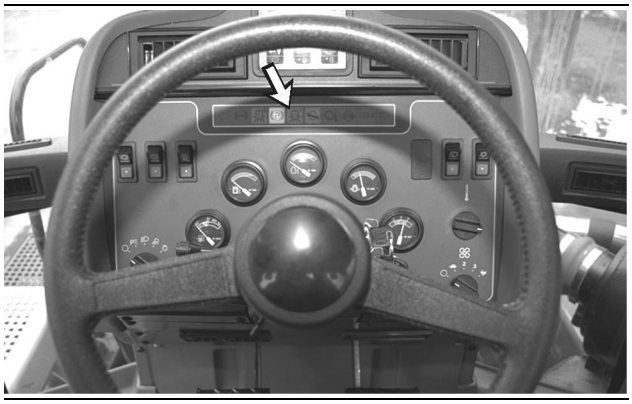


Illustration 348 g00408685

An indicator on the dash panel will illuminate when the implement return oil filter is plugged.

1. Place an oil pan below the filter that will be replaced. You may lose a small amount of oil when you replace each filter.

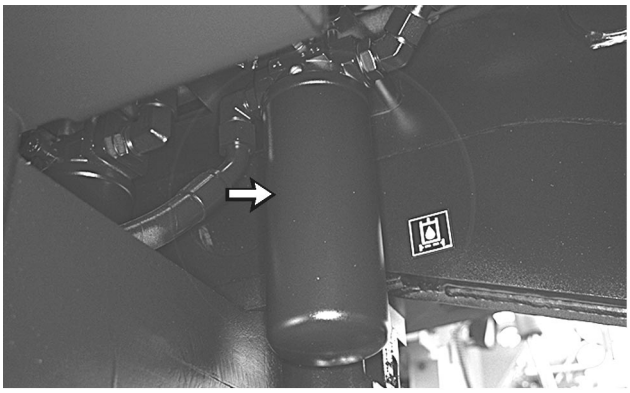


Illustration 349 g00408686

2. The implement return oil filter is located on the right side of the machine. The filter is located below the cab behind the axle. Access the implement return oil filter below the machine. Remove the filter element. Inspect the filter for debris. See Operation and Maintenance Manual, “Oil Filter - Inspect”.

3. Wipe the sealing surface of the filter base. Make sure that you remove all of the former filter seal.

4. Apply a thin coat of oil to the seal on the new filter. Install the filter by hand. When the filter seal contacts the filter base, tighten the filter element by an additional turn of 270 degrees. Rotation marks are spaced at 90 degree intervals. Use these rotation marks as a guide for proper tightening.

i00831540

Main Drive Shaft Slip Spline - Lubricate

SMCS Code: 3253-086

Note: Lubricate the slip spline for the main drive shaft with Caterpillar Multipurpose Molybdenum Grease (MPGM). Refer to Operation and Maintenance Manual, “Lubricating Greases”.

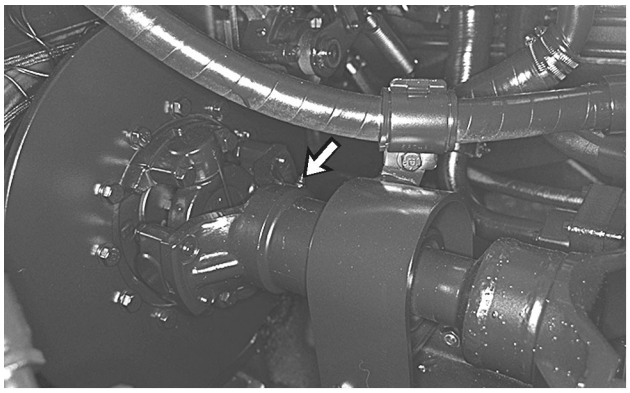


Illustration 350 g00404066

Lubricate one fitting that is on the spline. This is located on the drive shaft that is between the transmission and the differential. Access the fitting from the location underneath the machine.

i01183563

Midwheel Hub Oil Level - Check

SMCS Code: 4180-535-FLV

Note: Inspect the oil level frequently if you operate the machine in extremely wet conditions or extremely muddy conditions.

1. Park the machine on a hard, level surface. Place chocks at the front of the belts and at the rear of the belts.

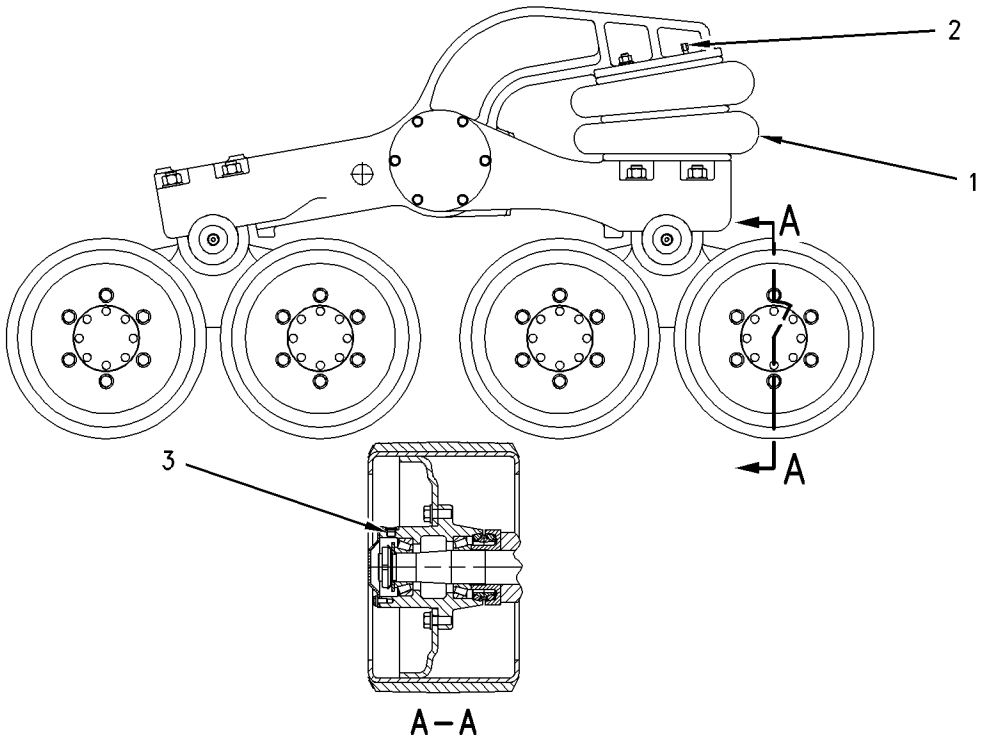


Illustration 351 g00633890

2. Deflate the air from spring (1) through valve assembly (2).

3. Rotate the midroller so that oil level/fill plug (3) is located at the 2 o'clock position.

4. Clean the area around oil level/fill plug (3). Then remove oil level/fill plug (3).

5. Maintain the oil level to the bottom of the threads of the hole for oil level/fill plug (3). If the oil level is low, add oil. See Operation and Maintenance Manual, "Refill Capacities" for additional information.

6. Install oil level/fill plug (3).

7. Repeat the procedure on the other midwheels. Make sure that you check the midwheels on the inner side of the undercarriages and outer side of the undercarriages.

8. Inflate the spring with air through valve assembly (2). See Operation and Maintenance Manual, "Air Spring Pressure" for the correct inflation pressure.

i00649305

Oil Filter - Inspect

SMCS Code: 1318-507; 3067-507; 5068-507

Inspect A Used Filter for Debris

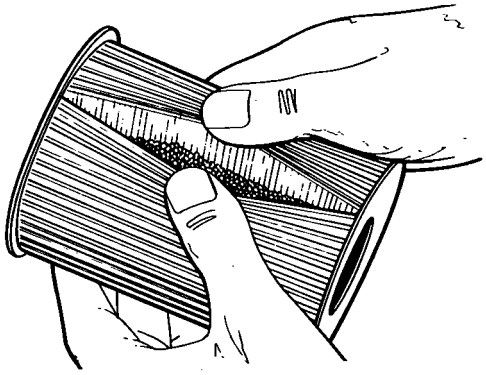


Illustration 352 g00100013

The element is shown with debris.

Use a **4C-5084** Filter Cutter to cut the filter element open. Spread apart the pleats and inspect the element for metal and for other debris. An excessive amount of debris in the filter element can indicate a possible failure.

If metals are found in the filter element, a magnet can be used to differentiate between ferrous metals and nonferrous metals.

Ferrous metals can indicate wear on steel parts and on cast iron parts.

Nonferrous metals can indicate wear on the aluminum parts of the engine such as main bearings, rod bearings, or turbocharger bearings.

Small amounts of debris may be found in the filter element. This could be caused by friction and by normal wear. Consult your Caterpillar dealer in order to arrange for further analysis if an excessive amount of debris is found.

Using an oil filter element that is not recommended by Caterpillar can result in severe damage to the engine and/or the hydraulic system. Engine bearings, the crankshaft, pumps, valves, cylinders and other parts may be damaged. This can result in larger particles in unfiltered oil. The particles could enter the lubricating system and the particles could cause damage.

i00834910

Parking Brake - Adjust

SMCS Code: 4267-025

Illustration 353 g00406502

The parking brake caliper has an automatic adjustment that always functions when full stroke is used. In order to check the adjustment, actuate the control twenty times to the top of the control's stroke. The effort should increase as each stroke is applied.

If the automatic adjustment has not been done for an extended period, excessive amounts of using the control is required in order to properly adjust the caliper.

If excessive use of the control is required or if the control feels loose after actuating twenty times, use the following procedure.

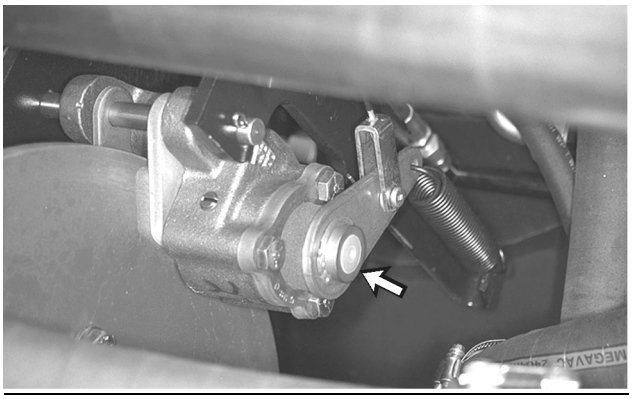


Illustration 354 g00406500

1. Remove the cap over the hole in the center of the input lever assembly. This is on the parking brake caliper which is located in front of the differential and below the cab.
2. Insert a 6.35 mm (0.25 inch) Allen wrench through the hole into the end of the rod. Turn counterclockwise until the rod is backed out fully.
3. Use the Allen wrench in order to turn the rod clockwise until the gap from the pad to the rotor is 0.38 mm (0.015 inch) on each side of the rotor.
4. Replace the cap on the hole in the lever assembly.

i00837547

Parking Brake Pads - Inspect/Replace

SMCS Code: 4267-040; 4267-510

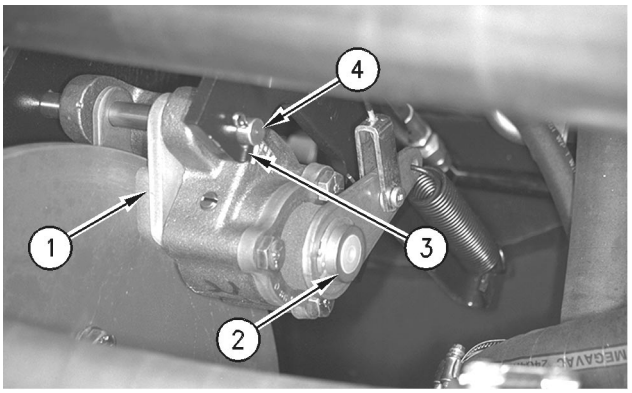


Illustration 355 g00409019

The brake pads should be replaced when the thickness of the lining on front brake pad (1) is less than 10 mm (.38 inch).

1. Remove cap (2) from the hole in the center of the lever assembly.
2. Insert a 1/4 inch allen wrench through the hole into the rod. Turn the allen wrench in the clockwise direction until the rod is all the way backed out.
3. Remove cotter pins (3). Slide retaining pins (4) in order to remove the used brake pads.
4. Insert the new brake pads. The thinner part of the brake pad goes to the rear of the machine.
5. Replace the pins and the cotter pins.
6. Use a 1/4 inch allen wrench in order to turn the rod in the clockwise direction until the gap is .38 mm (0.015 inch).
7. Replace the cap on the hole in the lever assembly.
8. Make the final adjustment from the cab. Repeatedly, apply the parking brake and release the parking brake. This should be done until the travel of the lever decreases and the travel becomes constant.

i01191328

Power Take-Off Drive Shaft - Lubricate

SMCS Code: 3253-086

Note: Lubricate the PTO drive shaft with Caterpillar Molybdenum Grease (MPGM). See Operation and Maintenance Manual, “Lubricating Greases”.

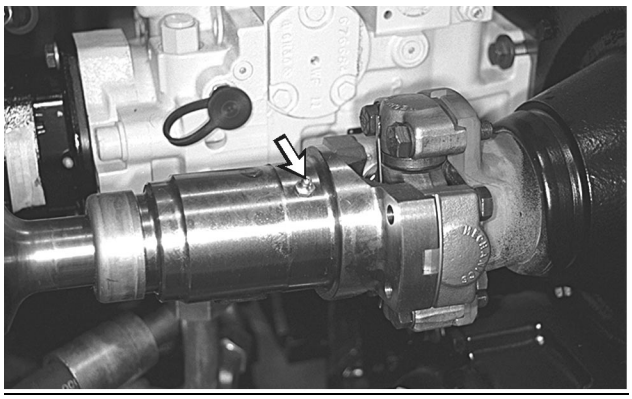


Illustration 356 g00407284

Lubricate one fitting on the spline. The fitting can be accessed when you are underneath the machine.

i01171817

Quick Hitch - Lubricate

SMCS Code: 7120-086

S/N: 6GS1-Up

S/N: 6HS1-Up

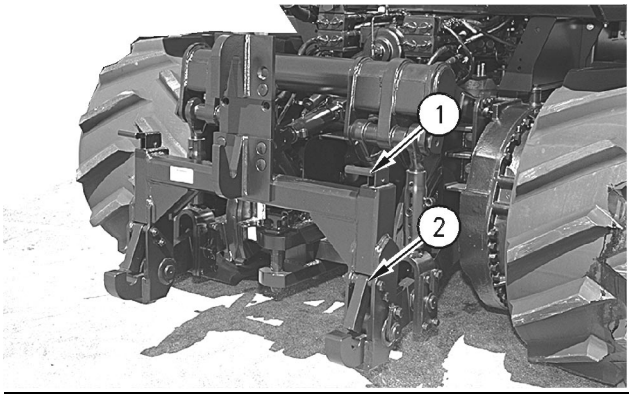


Illustration 357 g00404278

Lubricate the quick hitch at location (1) and at location (2). When you are using the three-point hitch, lubricate both sides of the quick hitch.

i00840114

Radiator Core - Clean

SMCS Code: 1353-070; 1805; 1810

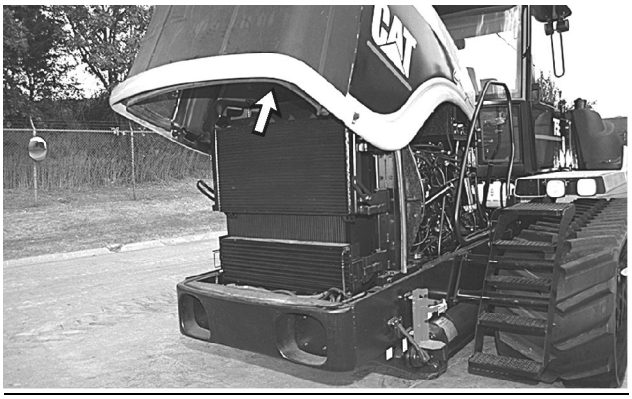


Illustration 358 g00377172

1. Raise the hood.

Note: See Operation and Maintenance Manual, “Engine Compartment Hood-Raise/Lower”.

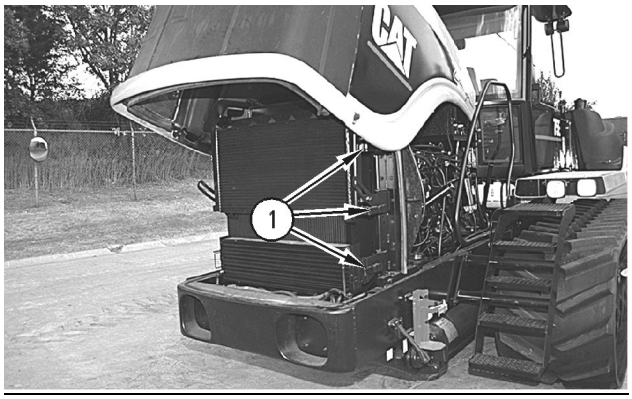


Illustration 359 g00377898

2. Unlatch cooler latches (1).

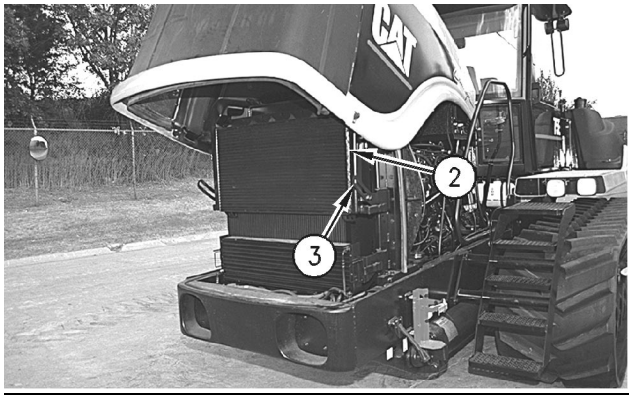


Illustration 360 g00378017

3. Raise air cooler (2).

4. Secure air cooler (2) with support (3).

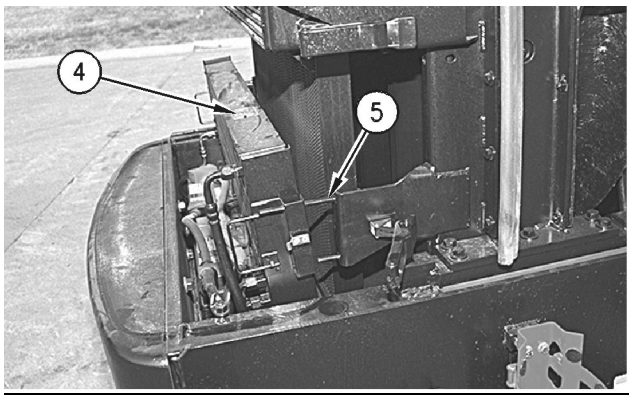


Illustration 361 g00378152

5. Use the handles on each side. The condenser core moves on slides (5). Pull out air conditioning condenser core (4).

6. Direct pressurized air or direct pressurized water at the radiator. Clean the radiator core of foreign material. The use of compressed air is preferred. Blow out the debris from the fan side first. Then clean debris from the front compartment.

Note: Use pressurized air with a maximum pressure of 205 kPa (30 psi). Use pressurized water with a maximum pressure of 280 kPa (40 psi).

7. After cleaning, push condenser core (4) against the mounting plates. Engage latches.

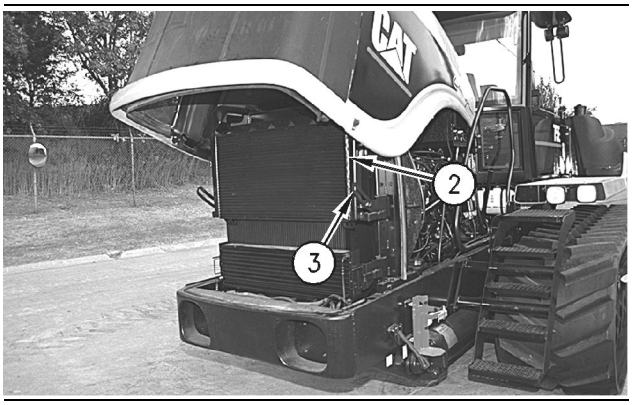


Illustration 362 g00378017

8. In order to disengage support (3), lift the support. Lower air cooler (2). Secure air cooler (2) with the rubber latches.

Illustration 363 g00377172

9. Lower the hood.

Note: See Operation and Maintenance Manual, “Engine Compartment Hood-Raise/Lower”.

i00839204

Radiator Pressure Cap - Clean/Replace

SMCS Code: 1353-070-CAP; 1353-510-CAP

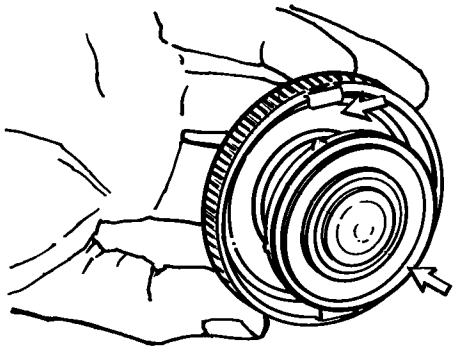


Illustration 364 g00410698

The relief valve should be cleaned or replaced if the system overheats or if loss of coolant is observed.

1. Remove the radiator cap slowly in order to relieve pressure.
2. Inspect the relief valve and the gasket in the radiator cap. Replace the radiator cap if the valve or the gasket are worn or damaged.

i00836504

Right Side Access Ladder - Install/Remove

SMCS Code: 7254-010

Access to the right side of the machine is accomplished through the use of the ladder. Use the following procedure in order to install the ladder.

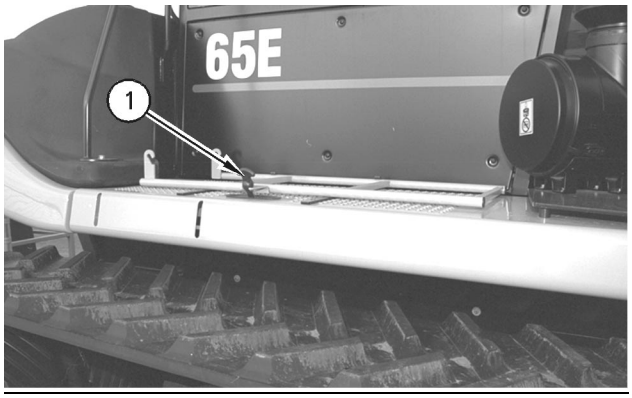


Illustration 365 g00407978

1. In order to remove the ladder from the storage location on the right fender, release latch (1). Pull the ladder outward.

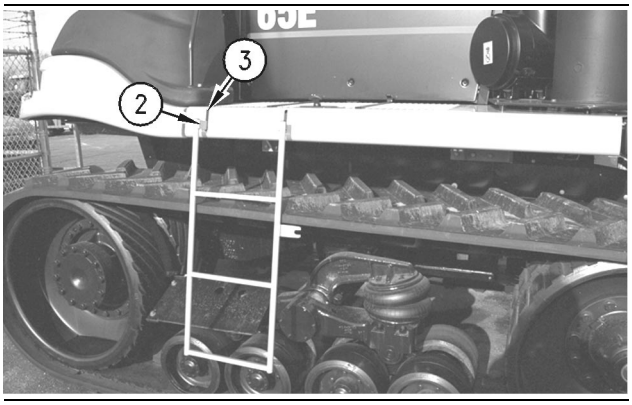


Illustration 366 g00407998

2. Insert hook (2) into slots (3) on the right fender. Make sure that the ladder is secure before you use the ladder.
3. In order to remove the ladder, reverse the procedure.

i00837489

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7325-040

Illustration 367 g00408946

Front ROPS mounting bolts are located on each side of the front of the cab. Lift the floormat in order to access the front ROPS mounting bolts.

Illustration 368 g00408947

Rear ROPS mounting bolts are located on both sides at the rear of the cab. One of the bolts is located inside of the trainer seat. Remove the trainer seat in order to access this bolt.

1. Inspect the ROPS for the following items: loose bolts, missing bolts, and damaged bolts. Replace damaged bolts and missing bolts with original equipment parts only.

2. Tighten all of the ROPS mounting bolts to a torque of 400 ± 70 N·m (300 ± 50 lb ft).

3. Do not attempt to straighten the ROPS structure. Do not repair the ROPS by welding reinforcement plates to the structure. Do not drill into the ROPS structure.

If there are any cracks in the welds, in the castings, or in any metal section of the ROPS, consult your Caterpillar dealer for repairs.

i00718241

Seat Belt - Inspect

SMCS Code: 7327-040

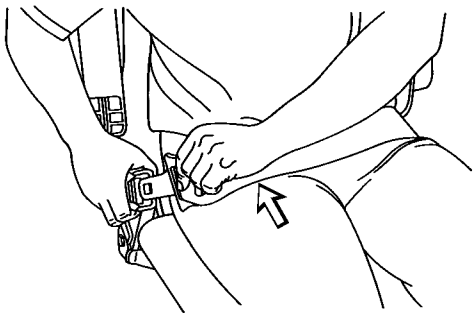


Illustration 369 g00037721

Always check the condition of the seat belt and the condition of the belt mounting hardware before you operate the machine.

Inspect the belt mounting hardware. Replace any belt mounting hardware that is damaged or worn.

Regardless of the appearance, replace the seat belt once during every three year interval.

i00731002

Seat Belt - Replace

SMCS Code: 7327-510

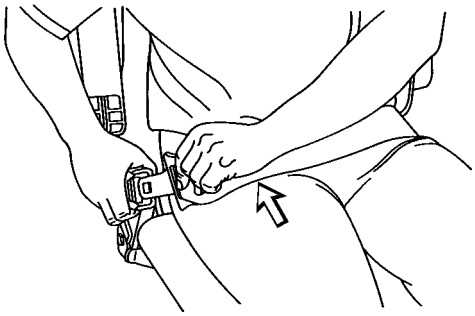


Illustration 370 g00037721

Regardless of the appearance, replace the seat belt once during every three year interval.

i01171857

Service Brake Disc Wear - Check

SMCS Code: 4251-535

Use the following procedure in order to check for worn brake discs.

1. Operate the machine until the oil reaches normal operating temperatures.

2. Park the machine on a smooth, level surface.

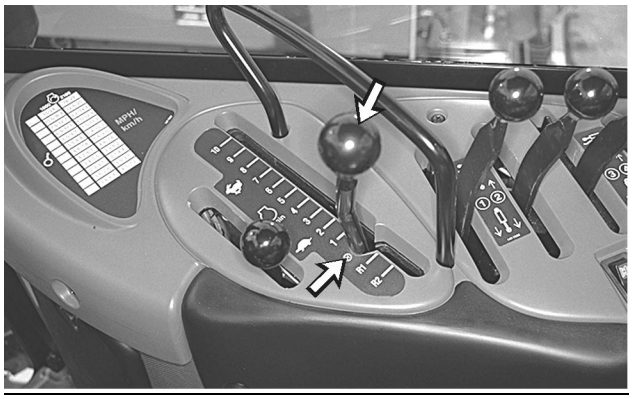


Illustration 371 g00398983

3. Move the transmission control lever to the NEUTRAL position.

Illustration 372 g00623209

4. Engage the parking brake.

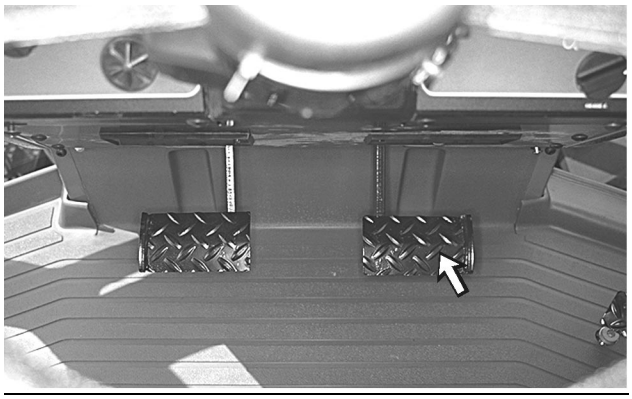


Illustration 373 g00391145

5. Depress the service brake pedal at two second intervals. Depress the pedal until the system recharges. A slight decrease in engine speed indicates that the system is recharging.

6. Fully apply the brakes at one minute intervals until the system recharges.

7. Record the number of applications before the system recharges.

8. If the system recharges prior to three full brake applications, the brake system should be inspected. Consult any Caterpillar dealer for more information.

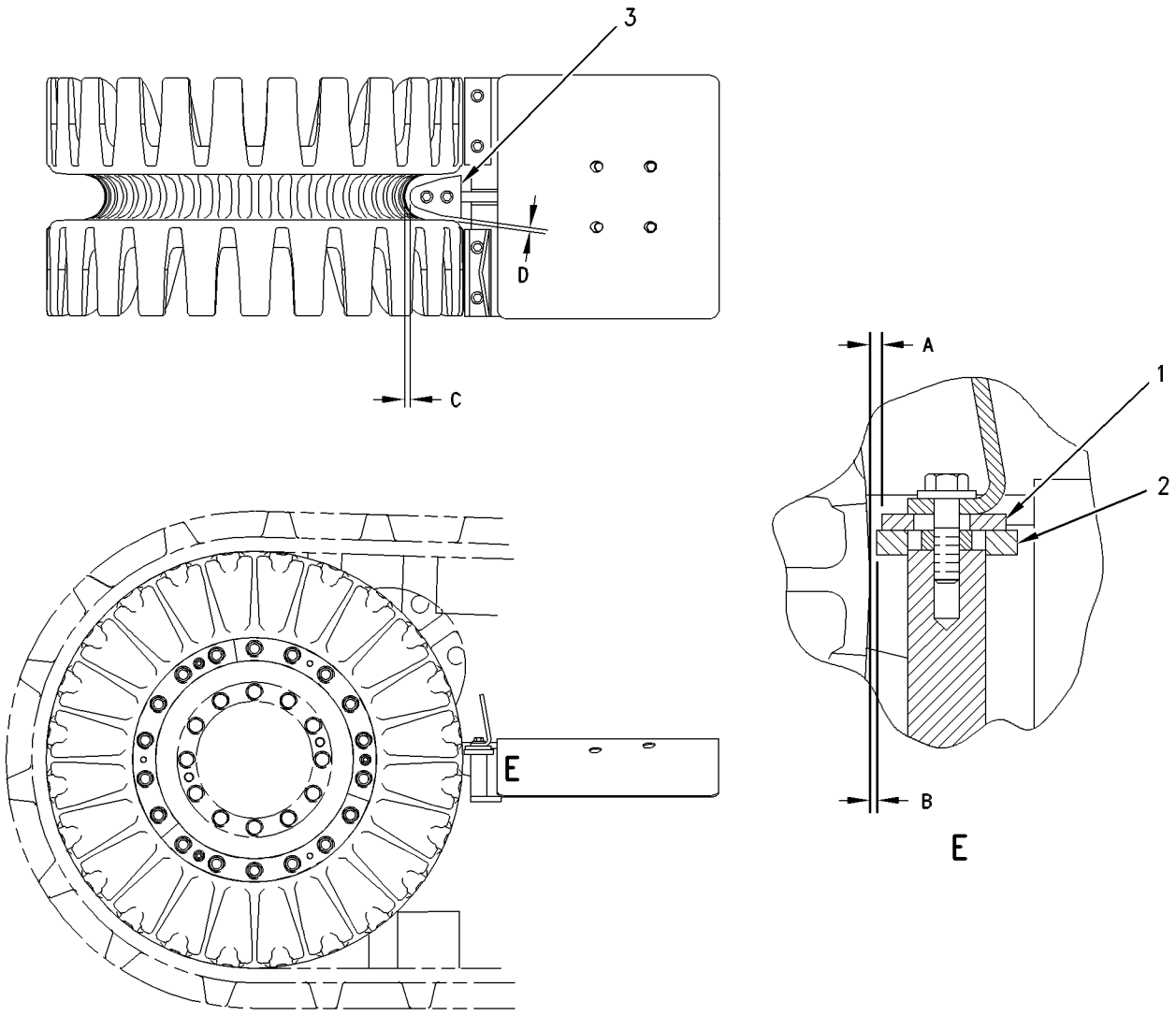
i01456920

Slotted Cast Drive Wheel Scrapers - Adjust

SMCS Code: 4199-025

Table 54

Required Tool		
Part Number	**Part Description**	**Qty**
155-1557	Cast Driver Gauge	1



g00410346

Illustration 374

Equipped with Sealed and Lubricated Undercarriage

(A) 5.0 ± 0.5 mm (0.17 ± 0.02 inch) initial adjustment
(B) 3.2 ± 0.5 mm (0.13 ± 0.02 inch) initial adjustment
(C) 12 ± 3 mm (0.50 ± 0.12 inch) initial adjustment
(D) 8 ± 3 mm (0.30 ± 0.12 inch) initial adjustment

Note: Make sure that the adjustment is made while the machine is on a flat floor. The belt must be properly tensioned. Also, make sure that the part number that is stamped on the slotted drive wheel is lined up with the scraper.

Note: The slotted drive wheel is recommended only for use in extremely muddy underfoot conditions.

Note: The cast slotted drive wheel should not be used in applications when the machine is pulling a scraper.

Adjust scraper (1) to an initial Dimension (A) of 5.0 ± 0.5 mm (0.17 ± 0.02 inch) by using **155-1557** Cast Driver Gauge. Adjust scraper (2) to an initial Dimension (B) of 3.2 ± 0.5 mm (0.13 ± 0.02 inch). Dimension (A) will increase as scraper (1) wears. When Dimension (A) wears to 9.0 mm (0.35 inch), readjust the scrapers to the original Dimension (A) of 5.0 ± 0.5 mm (0.17 ± 0.02 inch).

Scrapers may be inverted in order to provide additional service life. If a scraper is severely worn, the scraper should be replaced.

Scraper (3) is installed in order to provide a clean groove for the guide blocks. Adjust scraper (3) in order to provide a Dimension (C) of 12 ± 3 mm (0.50 ± 0.12 inch). Dimension (C) is between the center of the drive wheel and the end of the scraper. The Dimension (D) between scraper (3) and the edge of the drive wheel should be 8 ± 3 mm (0.30 ± 0.12 inch).

Scrapers that are missing or scrapers that are not adjusted properly can severely shorten the life of the belt. Make sure that the scrapers are adjusted correctly and that the bolts are tight. If a scraper is severely worn, the scraper should be replaced.

i00838958

Slotted Cast Drive Wheel Scrapers - Check

SMCS Code: 4199-535

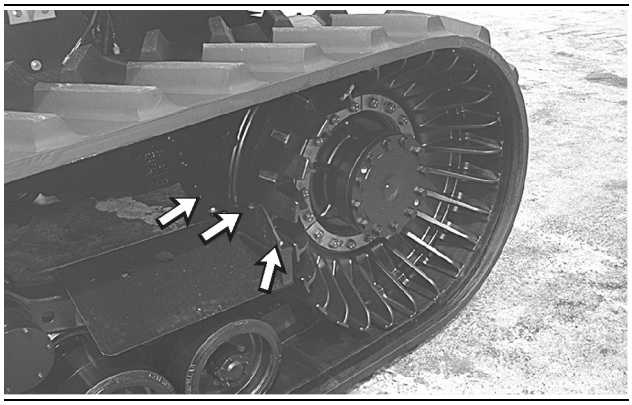


Illustration 375 g00410355

The belt's life may be shortened by missing scrapers or scrapers that are not properly adjusted. Make sure that the scrapers are in place and that the bolts are tight. Severely worn scrapers should be replaced.

i00837121

Steering and Hydraulic System Oil Sample - Obtain

SMCS Code: 4129-008; 5050-008; 7542-008

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide", for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

Obtain the sample of the hydraulic oil as close as possible to the recommended sampling interval. The recommended sampling interval is every 250 service hours. In order to receive the full effect of S·O·S oil analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent oil samplings that are evenly spaced.

1. Before you obtain an S·O·S oil sample, operate the machine until the oil is warm and the oil is well circulated. Then obtain the S·O·S oil sample.

NOTICE

Do not use the same vacuum sampling pump for extracting oil samples that is used for extracting coolant samples.

A small residue of either type sample may remain in the pump and may cause a false positive analysis for the sample being taken.

Always use a designated pump for oil sampling and a designated pump for coolant sampling.

Failure to do so may cause a false analysis which could lead to customer and dealer concerns.

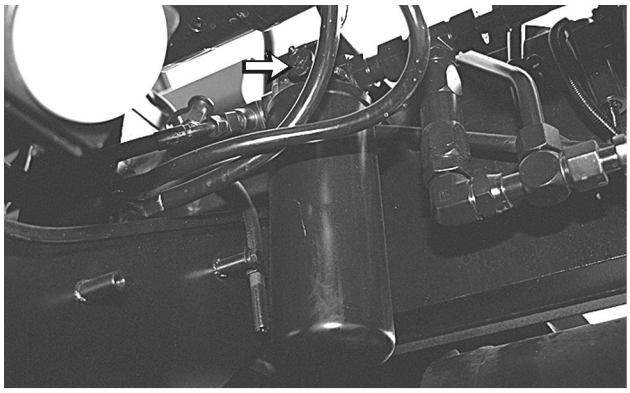


Illustration 376 g00408518

The sampling valve for the hydraulic system is located on the base for the steering filter. Access the sampling valve from the right side of the machine.

2. Use a sampling gun in order to obtain the oil sample from the sampling valve. Do not take the oil sample from the drain stream, because a stream of dirty oil from the bottom of the compartment will contaminate the sample. Likewise, never dip an oil sample from an oil container or pour a sample from a used filter.

Consult any Caterpillar Dealer for complete information and assistance about the S·O·S oil analysis program.

i00837415

Steering System Oil Filter - Replace

SMCS Code: 4304; 5068

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

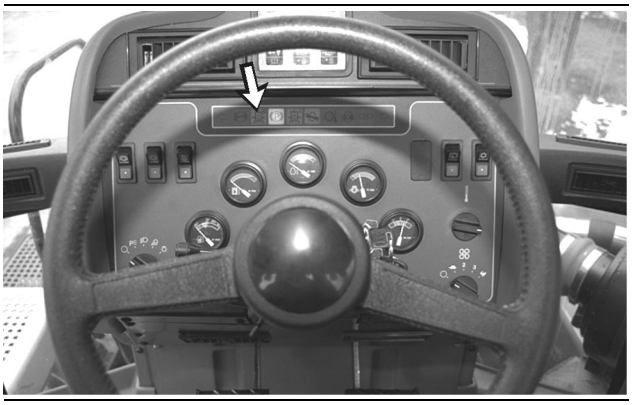


Illustration 377 g00408918

An indicator on the dash panel will illuminate when the steering filter is blocked.

1. Place an oil pan below the filter that will be replaced. You may lose a small amount of oil when you replace each filter.

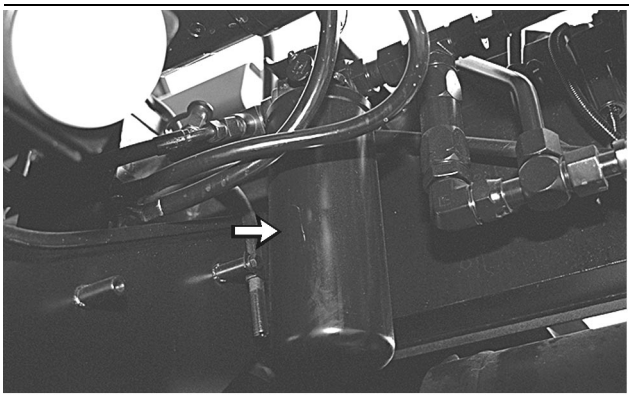


Illustration 378 g00408858

2. The steering filter is located on the left side of the machine. The filter is located below the cab in front of the midbeam. Access the steering filter below the machine. Remove the filter element. Inspect the filter for debris. See Operation and Maintenance Manual, “Oil Filter - Inspect”.

3. Wipe the sealing surface of the filter base. Make sure that you remove all of the former filter seal.

4. Apply a thin coat of oil to the seal on the new filter. Install the filter by hand. When the filter seal contacts the filter base, tighten the filter element by an additional turn of 270 degrees. Rotation marks are spaced at 90 degree intervals. Use these rotation marks as a guide for proper tightening.

i01191341

Three-Point Hitch-Lubricate

SMCS Code: 7120-086

S/N: 6GS1-Up

S/N: 6HS1-Up

Note: Lubricate the three-point hitch linkage with Caterpillar Multipurpose Molybdenum Grease (MPGM). See Operation and Maintenance Manual, “Lubricating Greases”.

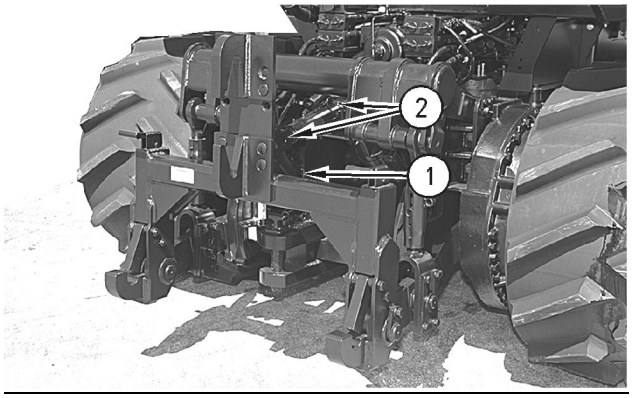


Illustration 379 g00404318

Lubricate one fitting (1) at the bottom of both lift cylinders.

Lubricate two fittings (2) on the pitch control link.

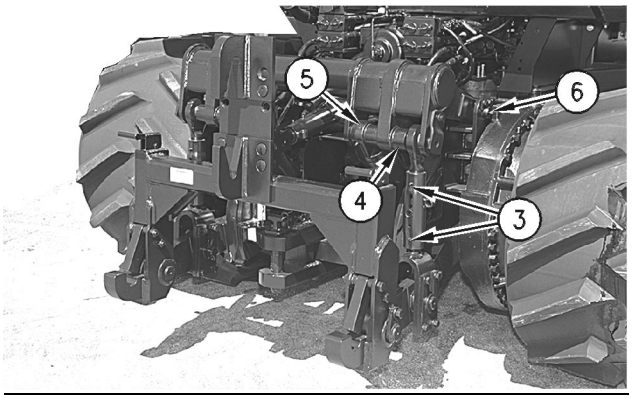


Illustration 380 g00404338

Lubricate two fittings (3) on each lift link.

Lubricate one fitting (4) on each pin of the rockshaft assembly.

Lubricate one fitting (5) at the top of both lift cylinders.

Lubricate one fitting (6) at the location of the rockshaft that is attached to the machine.

i00837670

Transmission Breather - Clean

SMCS Code: 3030-070-BRE

The breather is located on the left, front corner of the transmission.

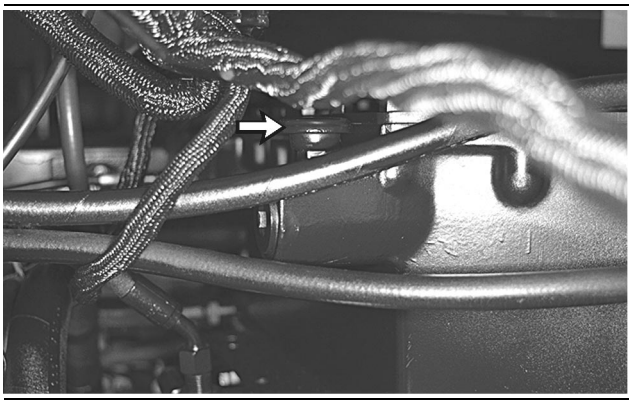


Illustration 381 g00409139

1. Remove the breather.

2. Wash the breather in a clean, nonflammable solvent. Allow the breather to dry.

3. Install the breather.

i00838006

Transmission Oil - Change

SMCS Code: 3030; 3080-044

⚠ WARNING

Hot oil and components can cause personal injury.

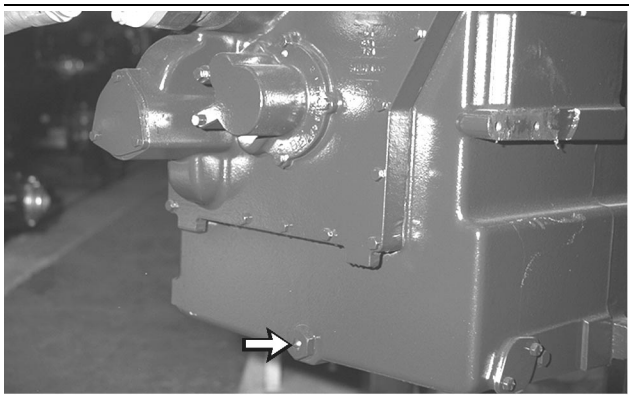
Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.



g00409444

Illustration 382

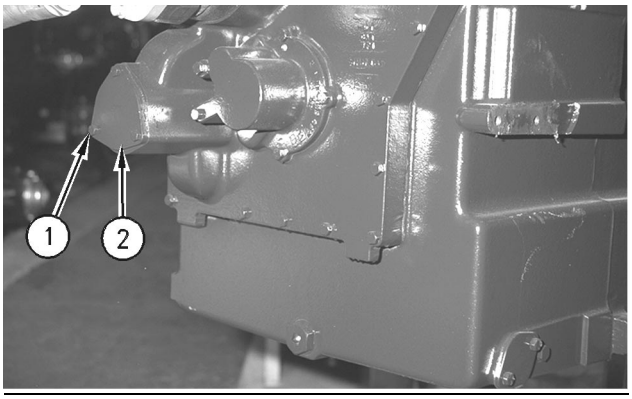
Front view

The drain plug for the transmission is located at the front of the transmission case. Access the drain plug below the machine.

1. Park the machine on a hard, level surface. Stop the engine. Allow the oil to cool for five minutes. However, the transmission oil should be warm for this procedure.

2. Thoroughly clean the drain plug before you remove the plug. Remove the plug. Drain the oil into a suitable container.

3. Clean the drain plug and install the drain plug.



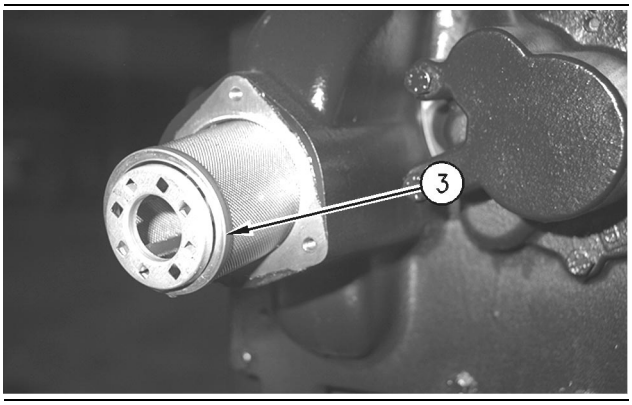
g00409519

Illustration 383

Front view

Note: Remove the transmission screen. Then, clean the transmission screen. This should be done whenever the transmission is drained. The transmission screen is located at the lower front of the transmission behind the access cover.

4. Remove bolts (1) and cover (2).



g00409521

Illustration 384

5. Remove transmission screen (3). Remove the magnets from the screen.

6. Wash the screen and wash the magnets in a clean, nonflammable solvent. Allow the screen and the magnets to dry.

7. Install the magnets into the screen. Install the screen, the cover, and the bolts.

Illustration 385 g00409258

8. Remove the filler cap. Add the correct type of oil. Add oil until the oil level is between the “ADD” mark and the “FULL” mark on the sight glass.

Note: See Operation and Maintenance Manual, “Lubricant Viscosities” for the correct type of oil.

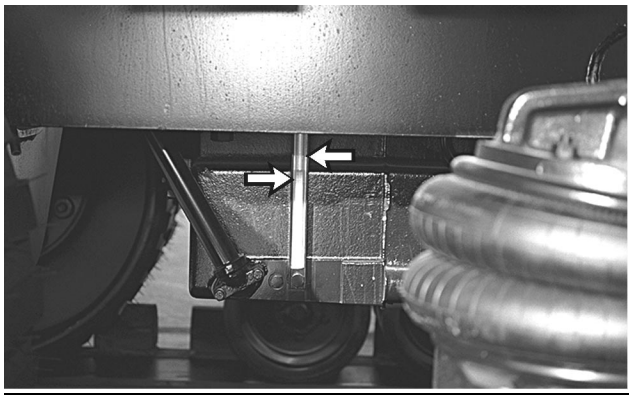


Illustration 386 g00409239

9. Check the oil level. The oil level should be between the “ADD” mark and the “FULL” mark on the sight glass.

10. Start the engine. Run the engine for a few minutes in order to check for leaks.

11. Stop the engine.

12. Maintain the oil level between the “ADD” mark and the “FULL” mark on the sight glass.

i00837909

Transmission Oil Filter - Replace

SMCS Code: 3067-510

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

1. Place an oil pan below the filter that will be replaced. You may lose a small amount of oil when you replace each filter.

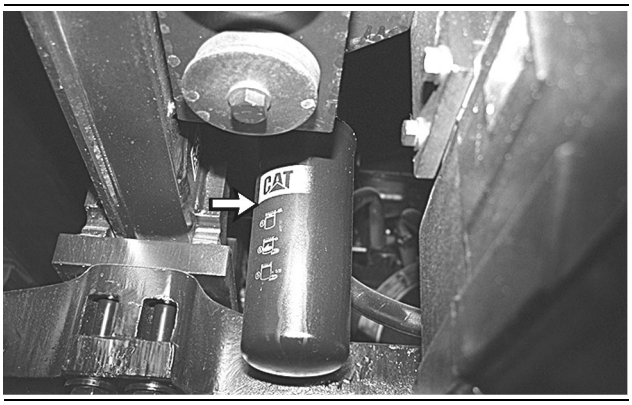


Illustration 387 g00409360

2. The transmission filter is located on the right side of the machine. The filter is located below the cab in front of the midbeam. Access the transmission filter below the machine. Remove the filter element. Inspect the filter for debris. See Operation and Maintenance Manual, “Oil Filter - Inspect”.

3. Wipe the sealing surface of the filter base. Make sure that you remove all of the former filter seal.

4. Apply a thin coat of oil to the seal on the new filter. Install the filter by hand. When the filter seal contacts the filter base, tighten the filter element by an additional turn of 270 degrees. Rotation marks are spaced at 90 degree intervals. Use these rotation marks as a guide for proper tightening.

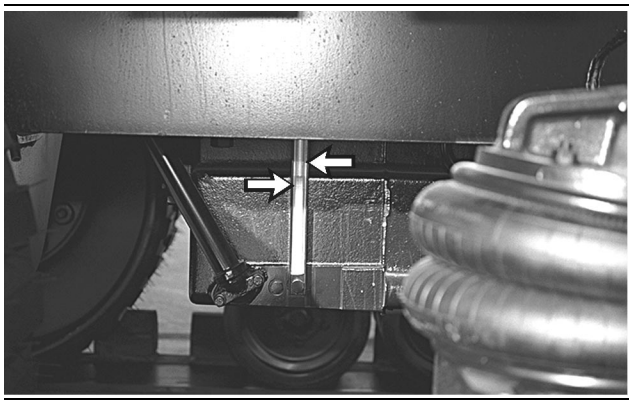


Illustration 388 g00409239

5. Check the oil level with cold oil and a stopped engine. The oil level should be between the “ADD” mark and the “FULL” mark on the sight glass.

6. Start the engine. Run the engine for a few minutes in order to check for leaks.

7. If the oil level is low, add oil.

Illustration 389 g00409258

a. Remove the filler cap.

b. Add the correct type of oil. Add oil until the oil level is between the “ADD” mark and the “FULL” mark on the sight glass.

Note: See Operation and Maintenance Manual, “Lubricant Viscosities” for the correct type of hydraulic oil.

c. Clean the filler cap. Install the filler cap.

d. Maintain the oil level between the “ADD” mark and the “FULL” mark on the sight glass.

i00837820

Transmission Oil Level - Check

SMCS Code: 3030-535-FLV; 3080-535-FLV

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

Illustration 390 g00409238

The sight glass for the transmission is located on the left side of the transmission case. The sight glass is visible between the front idler and the midwheels on the left side of the machine.

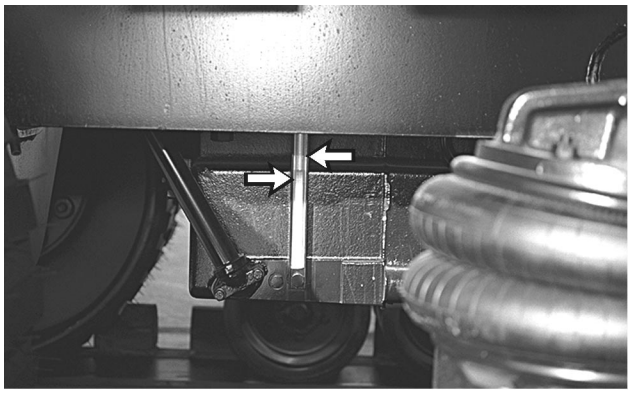


Illustration 391 g00409239

1. Check the oil level with cold oil and a stopped engine. The oil level should be between the “ADD” mark and the “FULL” mark on the sight glass.

2. If the oil level is low, add oil.

Illustration 392 g00409258

   a. Remove the filler cap.

   b. Add the correct type of oil. Add oil until the oil level is between the “ADD” mark and the “FULL” mark on the sight glass.

Note: See Operation and Maintenance Manual, “Lubricant Viscosities” for the correct type of hydraulic oil.

   c. Clean the filler cap. Install the filler cap.

   d. Maintain the oil level between the “ADD” mark and the “FULL” mark on the sight glass.

i00836604

Transmission Oil Sample - Obtain

SMCS Code: 3030-008; 7542-008

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

Obtain the sample of the transmission oil as close as possible to the recommended sampling interval. The recommended sampling interval is every 250 service hours. In order to receive the full effect of S·O·S oil analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent oil samplings that are evenly spaced.

1. Before you obtain an S·O·S oil sample, operate the machine until the oil is warm and the oil is well circulated. Then obtain the S·O·S oil sample.

NOTICE

Do not use the same vacuum sampling pump for extracting oil samples that is used for extracting coolant samples.

A small residue of either type sample may remain in the pump and may cause a false positive analysis for the sample being taken.

Always use a designated pump for oil sampling and a designated pump for coolant sampling.

Failure to do so may cause a false analysis which could lead to customer and dealer concerns.

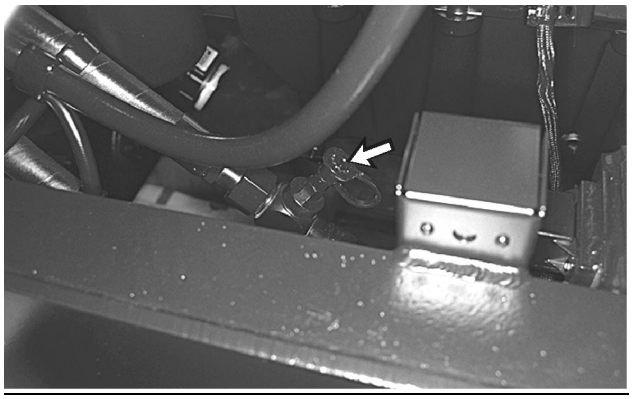


Illustration 393 g00408058

The sampling valve for the transmission is located on a tee in the hydraulic line for the transmission oil cooler. Access the sampling valve from the right side of the machine.

2. Use a sampling gun in order to obtain the oil sample from the sampling valve. Do not take the oil sample from the drain stream, because a stream of dirty oil from the bottom of the compartment will contaminate the sample. Likewise, never dip an oil sample from an oil container or pour a sample from a used filter.

Consult any Caterpillar Dealer for complete information and assistance about the S·O·S oil analysis program.

i01172214

Walk-Around Inspection

SMCS Code: 7000-040

⚠ WARNING

Personal injury or death can result from escaping fluid under pressure.

Escaping fluid under pressure, even a very small pin-hole size leak, can penetrate body tissue, causing serious injury, and possible death.

Always use a board or cardboard when checking for a leak.

Do not check for pin hole leaks in pump or motor hoses during a steer stall condition.

If fluid is injected into your skin, it must be treated by a doctor familiar with this type of injury immediately.

NOTICE
Accumulated grease and oil on an engine is a fire hazard.

Remove this debris with steam cleaning or high pressure water each time any significant quantity of oil (or other fluid) is spilled on or near the engine.

Wipe clean all fittings, caps and plugs before servicing.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

General Inspection

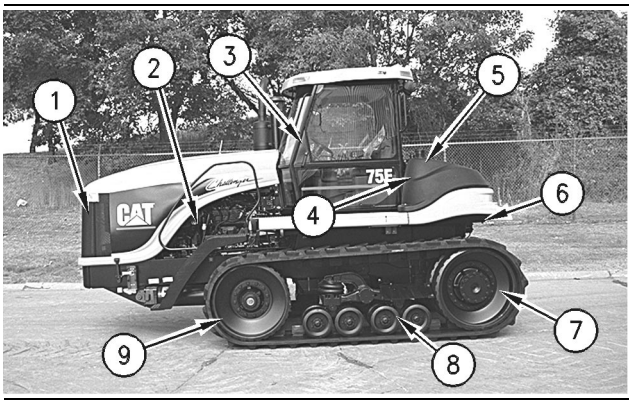


Illustration 394 g00410198

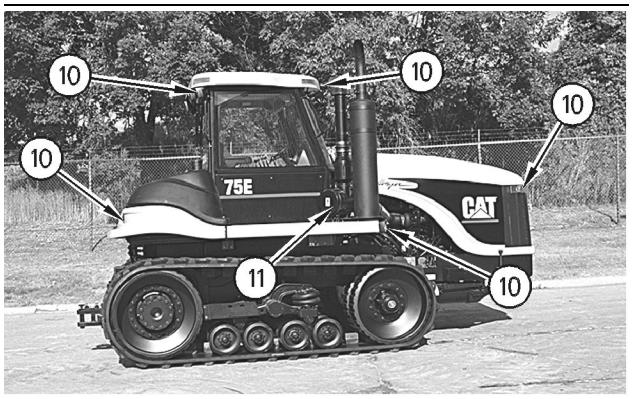


Illustration 395 g00410318

1. Make sure that covers and guards are securely in place. Inspect the machine for damage.

2. Remove the following debris from the machine: trash, rocks, and buildup of mud. Pay special attention to the following areas:

- Stairs
- Cab (3)
- Engine compartment (2)
- Radiator (1)
- Cooler cores (1)
- Radiator screen (1)
- Three-point hitch linkage (6)
- The area between the belts and the main structure of the machine
- Idlers (9)
- Midwheels (8)
- Drive wheels (7)

3. Check for oil leaks. Correct any oil leaks. Pay special attention to the following areas:

- Belt tension cylinders
- Idlers (9)
- Midwheels (8)
- Drive wheels (7)
- Final Drives (7)
- Engine compartment (2)
- Transmission case and transmission solenoids
- Lift cylinders for the three-point hitch (6)
- Implement control valve bank (6)
- Hydraulic oil filters
- Hydraulic pumps
- Hydraulic motors

4. Check the fuel tank (5) and the fuel lines for leaks. Correct fuel leaks before you start the engine.

5. Maintain the fuel level at the bottom of the filler neck in order to prevent moisture condensation in the fuel tank.

6. Maintain the hydraulic oil level between the “ADD” mark and the “FULL” mark that is on the sight gauge (4).

7. Check the engine cooling system for leaks and for faulty hoses. As required, repair the components or replace the components.

8. Inspect the engine air filter indicator (11). Service the air cleaner if the yellow piston in the filter element indicator moves into the red zone.

9. Inspect the condition of the following components:

- Alternator belt
- Air conditioning compressor belt

Make sure that the screens for the alternator are clean. Operation of an alternator with plugged screens can reduce the service life of the alternator.

As required, tighten the belts or replace the belts.

10. Inspect the three-point hitch linkage for damage and for excessive wear. As required, repair the components.

11. Inspect the following components for damage or for excessive wear:

- Three-point hitch linkage
- Drawbar
- Drawbar support
- Drawbar wearplate

- Drawbar pin
- Swing stops

As required, repair the components or replace the components.

12. Inspect the operation of dash lamps. Also, inspect the operation of all external lamps (10). As required, repair any nonfunctional lamps or replace any nonfunctional lamps.

13. Inspect all hose clamps. As required, tighten the clamps.

14. Check the horn for proper operation.

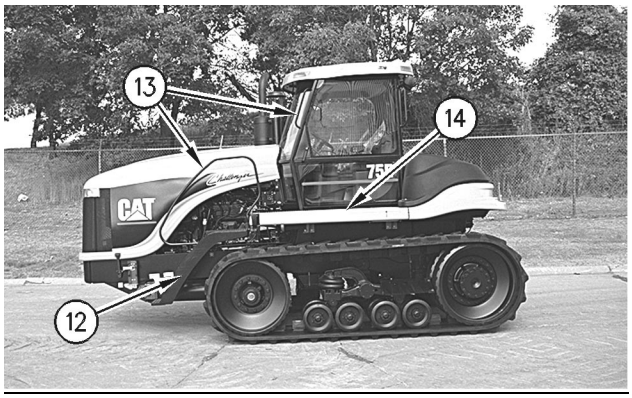


Illustration 396 g00410352

15. Inspect the condition and the cleanliness of the following components:

- Stairs (12)
- Handholds (13)
- Platform (14)

16. Inspect the Rollover Protective Structure (ROPS) for damage. Consult any Caterpillar dealer for any necessary repairs.

17. Inspect the cab for cleanliness. Remove any heavy, unsecured objects from the cab.

18. Inspect all hydraulic lines and hydraulic hoses for the following conditions:damage, excessive wear, and looseness. As required, repair the hydraulic lines or replace the hydraulic lines.

19. Drain any accumulated water from the fuel tank. Also, drain accumulated water from the water separator.

Inspection of the Belts and Undercarriage

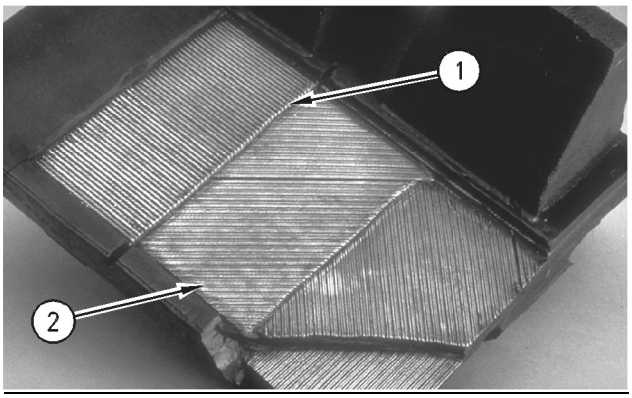


Illustration 397 g00300858

The rubber belt is composed of several layers of cable. The cables are similar to the cables in automotive tires. The most important set of cables is located approximately 8 mm (.3 inch) beneath the inside surface of the belt. These cables are called zero degree cables (1). The zero degree cables withstand the track tension. Other sets of cables are located between the zero degree cables and the outside surface of the belt. These cables are called breaker cables (2). Breaker cables lie in various angles in order to provide lateral support. Also, breaker cables protect the zero degree cables.

When any of the cables are exposed to moisture by cuts or gouges in the rubber, the cables can rust. Any exposed cables should be repaired as soon as possible. Consult any Caterpillar dealer.

Any damaged zero degree cables that protrude above the surface of the belt should be repaired. Repair the cables by clipping or grinding the cable. Clip or grind the cable so that the cable is below the surface of the belt. This will prevent additional damage.

If you break in the belts in very wet conditions or you break in the belts in dry, clean conditions, the rubber may scuff. The scuffing can last for 400 service hours. The guide blocks may appear moderately worn or severely worn on the surface. Some material may be removed. Although scuffing affects the appearance of the belt, the life of the guide blocks is not affected.

If scuffing occurs with high temperatures on the guide blocks, consult any Caterpillar dealer.

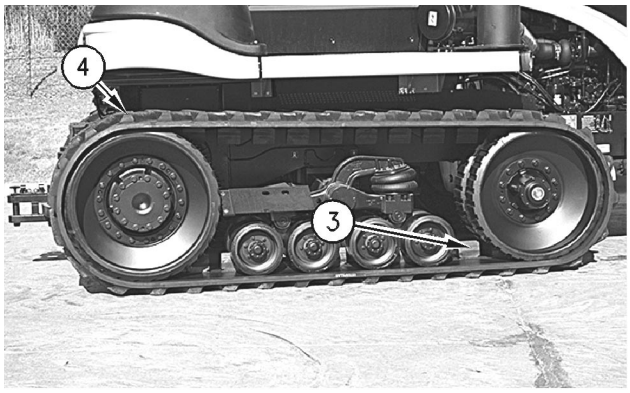


Illustration 398 g00410518

Cuts, gouges, and minor wear on guide blocks (3) will not cause operational problems. However, a standard belt that is missing more than three consecutive guide blocks should be repaired. A standard belt that is missing more than one-third of the total guide blocks should be repaired. A standard belt that is missing more than three consecutive guide blocks may come off the machine. This could damage other components on the undercarriage. A special application belt that is missing two or more consecutive guide blocks should be replaced. A special application belt that is missing more than one-fourth of the total guide blocks should be repaired. Refer to Special Instruction, REHS0151, “Procedure For Reinforcing and Bolting On Guide Blocks” for more information.

Portions of grouser (4) that separate from the belt will not significantly reduce traction. Replace a belt when the grouser height is less than 13 mm (0.5 inch) and when track slippage routinely exceeds 10 percent.

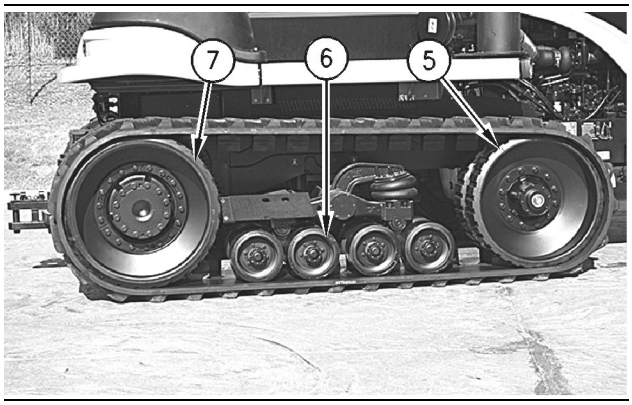


Illustration 399 g00410519

Pieces of rubber may separate from the following components on the undercarriage:

- Idlers (5)
- Midwheels (6)
- Drive wheels (7)

The rubber may come off the components because of rocks and debris that enter the undercarriage. Replace any idler or any midwheel that has 50 percent of the rubber missing.

Replace the drive wheel when missing rubber from the drive wheel causes track slippage between the belt and drive wheel.

i00828448

Windows - Clean

SMCS Code: 7310-070; 7340-070

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

Illustration 400 g00400521

Park the machine on a hard, level surface. If you cannot access the windows from the platform or from the stairs, use a squeegee with a long handle in order to clean the windows. Use the access ladder on the right side of the machine in order to access the windows on the right side of the machine.

Use commercially available window cleaning solutions in order to clean the windows.

i01191358

Window Washer Reservoir - Fill

SMCS Code: 7306-544

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Illustration 401 g00401978

The bottle for the windshield washer fluid is located in the left fender in front of the hydraulic tank.

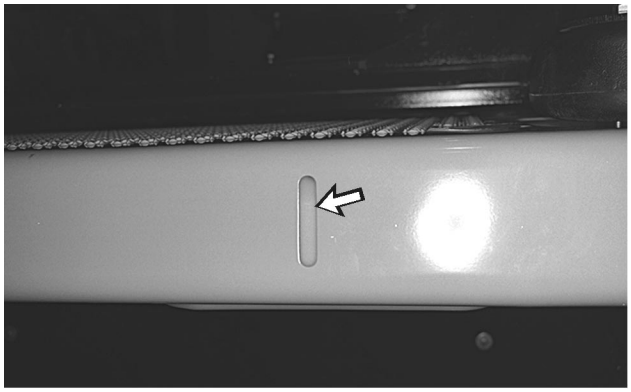


Illustration 402 g00401980

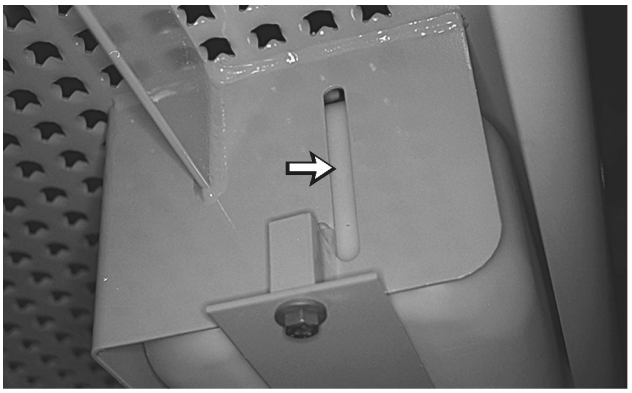


Illustration 403 g00401982

There are two sight gauges for the washer fluid bottle. One sight gauge is located in front of the washer fluid bottle. When you are underneath the fender, the bottle is visible. The other sight gauge is located on the side of the washer fluid bottle. When you are standing next to the machine, the bottle is visible through the slit in the fender.

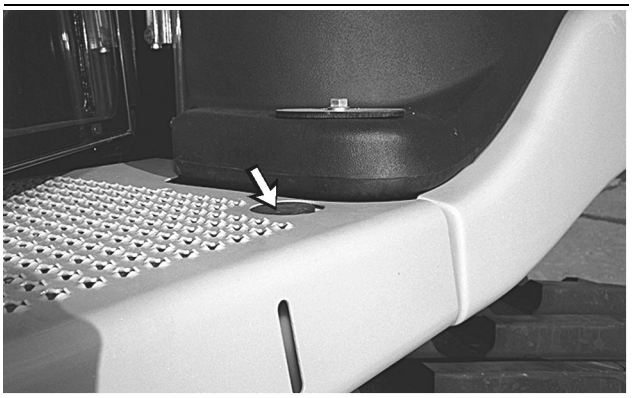


Illustration 404 g00401983

Remove the cap in order to fill the washer fluid bottle with commercially available windshield washer fluid.

NOTICE
Use Caterpillar nonfreezing window washer solvent or a commercially available windshield washer fluid in order to prevent freezing of the windshield washer system.

Note: In order to find information about the refill capacity of the washer fluid bottle, see Operation and Maintenance Manual, “Refill Capacities”.

i01228866

Window Wipers - Inspect/Replace

SMCS Code: 7305-040; 7305-510

Illustration 405 g00402285

Inspect the windshield wiper blades at the front and the rear of the cab. Replace any wiper blades that are damaged or worn. Replace any wiper blades that streak the windshield.